

THE NEW INTERNATIONAL ENCYCLOPÆDIA

SECOND EDITION

VOLUME XI

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KEY TO PRONUNCIATION

For a full explanation of the various sounds indicated, see the KEY TO PRONUNCIATION in Vol. I.

ā	as in ale, fate.	ch	as in chair, cheese.
â	" " senate, chaotic.	d	" " Spanish Almodovar, pulgada, where it is nearly like <i>th</i> in English then.
â	" " glare, care, and as <i>e</i> in there.	g	" " go, get.
ã	" " am, at.	g	" " German Landtag = <i>ch</i> in Ger. ach, etc.
ä	" " arm, father.	h	" <i>j</i> in Spanish Jijona, <i>g</i> in Spanish gila; like English <i>h</i> in hue, but stronger.
à	" " ant, and final <i>a</i> in America, armada, etc.	hw	" <i>wh</i> in which.
ɑ	" " final, regal, pleasant.	k	" <i>ch</i> in German ich, Albrecht = <i>g</i> in German Arensberg, Mecklenburg, etc.
a	" " all, fall.	n	" " in sinker, longer.
e	" " eve.	ng	" " sing, long.
ē	" " elate, evade.	N	" " French bon, Bourbon, and <i>m</i> in the French Etampes; here it indicates nasalizing of the preceding vowel.
ē	" " end, pet.	sh	" " shine, shut.
ē	" " fern, her, and as <i>i</i> in sir, etc.	th	" " thrust, thin.
e	" " agency, judgment.	TH	" " then, this.
i	" " ice, quiet.	zh	" <i>z</i> in azure, and <i>s</i> in pleasure.
i	" " quiescent.		
i	" " ill, fit.		
o	" " old, sober.		
ō	" " obey, sobriety.		
ō	" " orb, nor.		
ō	" " odd, forest, not.		
o	" " atom, carol.		
oi	" " oil, boil.		
ōō	" " food, fool, and as <i>u</i> in rude, rule.		
ou	" " house, mouse.		
ū	" " use, mule.		
ū	" " unite.		
ū	" " cut, but.		
u	" " full, put, or as <i>oo</i> in foot, book.		
ū	" " urn, burn.		
y	" " yet, yield.		
ɤ	" " Spanish Habana, Córdoba, where it is like English <i>v</i> but made with the lips alone.		

An apostrophe ['] is sometimes used as in tā'b'l (table), kǎz'm (chasm), to indicate the elision of a vowel or its reduction to a mere murmur.

For foreign sounds, the nearest English equivalent is generally used. In any case where a special symbol, as g, h, k, n, is used, those unfamiliar with the foreign sound indicated may substitute the English sound ordinarily indicated by the letter. For a full description of all such sounds, see the article on PRONUNCIATION.

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Professor Charles Knapp.
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THE NEW INTERNATIONAL ENCYCLOPÆDIA

HAWAII, BLUE LAWS OF. See BLUE LAWS.

HAWAIIAN (hä-wī'an) ISLANDS, or **HAWAII**, hä-wī'ē (formerly SANDWICH ISLANDS; politically, the TERRITORY OF HAWAII).

A chain of islands in the Pacific Ocean, belonging to the United States, forming geographically and ethnologically the extreme northeastern group of Polynesia. They are situated between latitudes 18° 54' and 22° 15' N., and between longitudes 154° 50' and 160° 30' W., about 2200 miles southwest of San Francisco, and 4893 miles from Hongkong. The chain consists of eight inhabited and several small uninhabited islands, arranged nearly all in single file extending for about 400 miles from southeast to northwest. The inhabited islands with their areas are, beginning at the southeast: Hawaii, 4015 square miles; Maui, 728; Kahului, 69; Molokai, 261; Lanai, 135; Oahu, 600; Kauai, 544; and Niihau, 97. Total area, 6449 square miles.

Topography and Geology. The islands are of purely volcanic origin, being really the summits of enormous volcanic cones raised from the bottom of the ocean, which falls rapidly to a depth of 18,000 feet not far from the shores. The islands are all mountainous, but only one, Hawaii, is actively volcanic, having two of the largest craters in the world, Mauna Loa and Kilauea (qq.v.). Hawaii is the most recent in order of formation; it is much less eroded than the others, and though it contains the highest peak of the group—Mauna Kea (q.v.), 13,805 feet—its elevations are all rounded and easily ascended. The other islands, especially Kauai, which is considered the oldest, are deeply eroded into picturesque crags and deep ravines and gorges. The coasts are to a large extent steep and rocky, consisting in some places of precipices 100 to 500 feet high and extending for several miles. There are some sandy beaches, however, and in many places the coasts are lined with coral reefs; between the mountains and the coasts extend fertile plains and valleys, which are the scene of agricultural activity.

Climate and Hydrography. The climate is in general characterized by a remarkable equability of temperature; it is never too warm and never cold, except on the mountain summits, and even within the narrow limits there are no sudden changes. This is due to the fact that there are neither large ice fields nor hot con-

tinental deserts within thousands of miles, and the winds which reach the islands have to pass over a broad expanse of water of a uniform and moderately warm temperature. The average temperatures of the lowlands of Hawaii are 70° F. for January and 78° F. for July, and the extreme maximum and minimum temperatures recorded are, respectively, 89° F. and 54° F. On the mountain peaks, of course, frosts occur, and snow sometimes remains throughout the year. The mean temperature is about 10 degrees cooler than in any other land in the same latitude. The winds show the same equability; the prevailing winds for 10 months in the year are the northeast trades. Alternate diurnal land and sea breezes occur, especially on the southwest coasts and around Hilo Bay on the northeast coast of Hawaii; warm southwest gales are also common in winter. Storms are rare, and hurricanes unknown. With respect to humidity and rainfall, however, the climate is extremely varied, each narrow locality having its own peculiar climate, depending on its position with regard to the winds and mountains. Most of the rain is brought by the northeast trade winds and, owing to the great elevation of the islands, it is almost all precipitated on the northeast sides, which have accordingly the most varied vegetation, while the leeward or southwest sides are much drier and, especially in Hawaii Island, almost arid. Just above Hilo Bay, where the cold winds from the mountains meet the warm and moist trade winds, there is an annual rainfall of 100 to 200, and even 250, inches, one of the heaviest in the world; but at Honolulu the rainfall is only about 32 inches a year. Though the sky is as a rule clear and sunny when it is not actually raining, the humidity is considerable, turning to almost oppressive sultriness during the period of winter southwest winds. In general, the climate is very healthful and agreeable to Europeans, but is not ideal for cases of pulmonary tuberculosis.

The rivers of Hawaii are nearly all small mountain torrents, and, as might be foreseen from the foregoing, they are largely confined to the north and east sides of the island.

Flora and Fauna. The indigenous flora and fauna of Hawaii are interesting, as they partake of the characters both of the Asiatic and Australian, as well as of the American, flora. There are about 130 species of ferns and 900 species of flowering plants, of which 600 are peculiar to the

islands. Some of the characteristic plants are a peculiar *Pandanus*, or screw pine, several tree ferns, and among the forest trees the *Koa* (*Acacia koa*). Forests still cover large areas of the uplands, but have greatly decreased. Where vegetation is found it generally grows luxuriantly, but large areas, especially in Hawaii, are covered with naked lava fields.

There are very few indigenous mammals in Hawaii, and no reptiles, except a single species of lizard. The birds are interesting, including many peculiar and highly specialized species, notably in the family *Drepanididae*, which differ characteristically from those of the rest of Polynesia. The land mollusks have also reached a remarkable development, almost every valley having its own peculiar species, some of which are allied to those of Mexico and California.

Agriculture. Of the twenty islands composing the Hawaiian group, only eight—Hawaii, Maui, Oahu, Kauai, Molokai, Lanai, Niihau, and Kahului—are inhabited. The most important islands—Hawaii, Maui, and Oahu—contain large areas of fertile land. The climatic conditions on these three islands are favorable for agricultural activity. Up to the middle of the nineteenth century land was held by feudal tenure. In 1848, however, a division was made by which about one-third of the inhabited area was set apart for the crown, another third for the government, and the remaining third for the powerful chiefs. The common people were given titles for the house lots which they held and for small pieces of land which they cultivated for themselves. The chiefs gradually lost possession of the land awarded to them and it fell to a large extent into the hands of foreigners. When, in 1893, the monarchy ceased to exist, the lands belonging to the crown were declared to be public lands, and, with other government lands, became the property of the United States government when the islands were annexed in 1898. In 1910 Congress passed measures amending the organic act of the Territory and providing for the consolidation of the administration of public lands in one department. It also made provision for the transfer of land for forestry or other public purposes.

The chief industries of the islands are related to agriculture, but conditions have been such, owing to lack of knowledge of practical agriculture, distance from the world's markets, tariffs, and other causes, that only a few products have been produced on a sufficient scale to export in considerable quantities. In recent years, however, scientific study has been made by the United States Department of Agriculture, and marked progress in the knowledge of possible crops and methods of cultivation has resulted. This is especially true of the sugar industry, in which scientific cultivation has resulted in enormous crops.

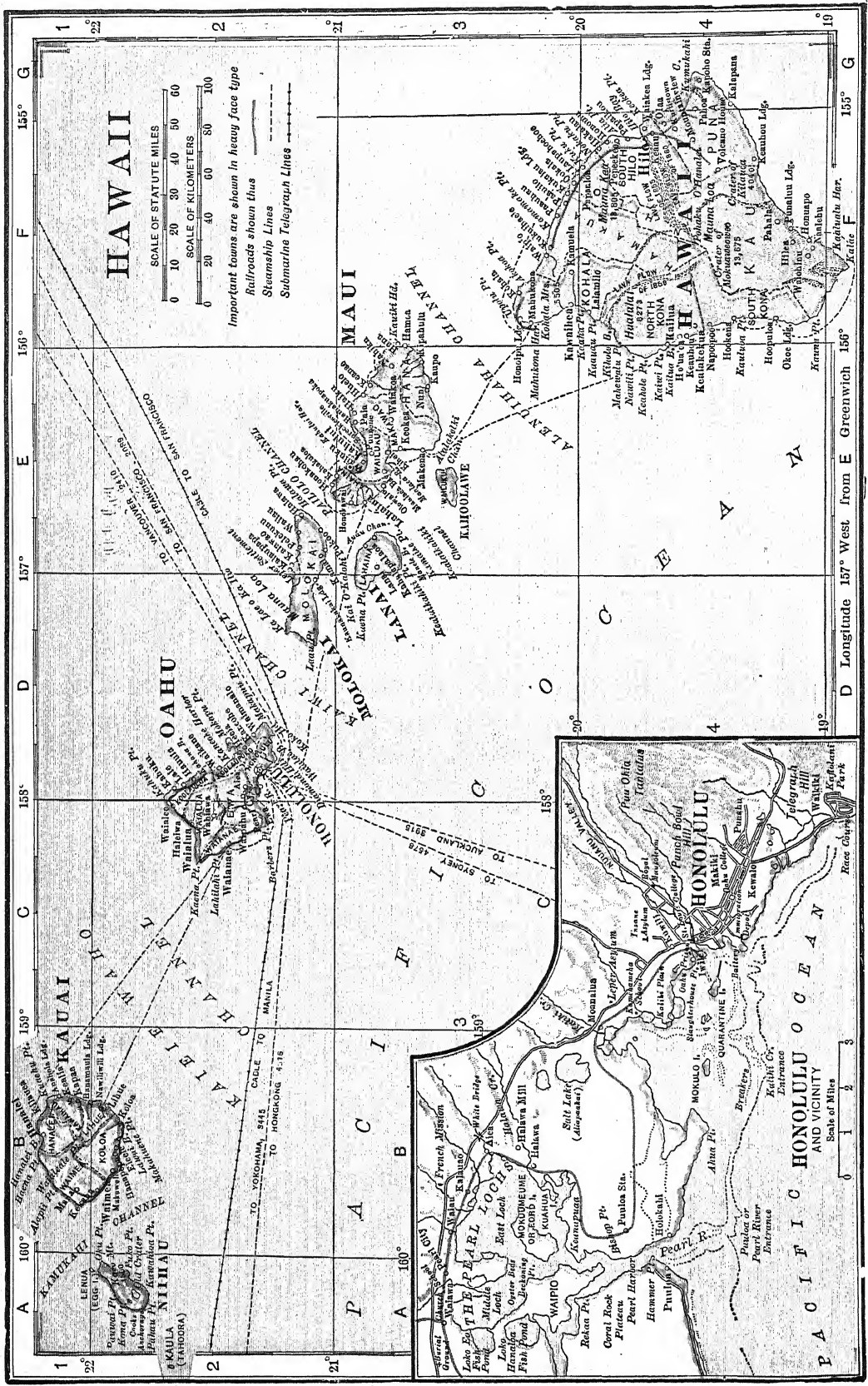
Between 1900 and 1910 the population of the islands increased by 37,908, or 24.6 per cent, while the number of farms increased by 2047, or 90.1 per cent. The total number of farms in 1910 was 4320, while in 1900 there were 2273. Out of an approximate area which includes both land and water area of 4,127,360 acres, there were in farms, in 1910, 2,590,600 acres, compared with 2,609,613 acres in 1900—a decrease in acreage in the decade of 19,013. The improved land in farms, however, increased from 294,645 in 1900 to 305,053 acres in 1910. The average acres per farm decreased from 1148.1 in

1900 to 599.7 in 1910, and the average improved acres per farm decreased from 129.6 in 1900 to 70.6 in 1910. The value of farm property, including land, buildings, implements and machinery, domestic animals, poultry and bees, increased from \$74,084,988 in 1900 to \$96,363,229 in 1910. The average value of land per acre was \$30.16 in 1910, compared with \$21.64 in 1900. In 1910 87.7 per cent of all the farms were under 50 acres in size.

Of the 4320 farms in 1910, 753 were operated by white farmers, 403 by Hawaiian, 2138 by Japanese, 876 by Chinese, 83 by other Asiatics, and 7 by negroes. The white farmers showed an increase in the decade of 47.9 per cent, while Hawaiian farmers decreased. The number of Japanese farmers increased 302.6 per cent in the decade. In 1910, 834 farmers out of a total of 4320 owned farms; 129 were part owners; 214 were share tenants; 2894 were cash tenants; and 249 were managers. The proportion of owners and part owners showed a great falling off in the decade 1900–10, the former being, in 1910 less than two-thirds and the latter less than one-half of the number shown in 1900.

The total value of crops in the islands in 1909 was \$28,536,000. Of this total, over nine-tenths was contributed by sugar cane. The only other crop with a value of product of over \$1,000,000 was rice; the fruits and nuts, vegetables, and the coffee produced in 1909 were each valued at over \$200,000. No other crop had a value amounting to \$100,000. The acreage of sugar cane in 1909 was 186,230 and the number of farms growing sugar cane was 1028, compared with 184 in 1899. The production of cane in 1909 was 4,240,000 tons, compared with 2,239,000 in 1899. The value of the sugar crop was \$26,306,000, compared with \$18,763,000 in 1899. The production and value of sugar since 1909 has been as follows: 1910, 518,127 short tons; 1911, 566,821 short tons; 1912, 595,258 short tons; 1913, 543,220 short tons, and this was valued at about \$37,000,000. The yield of cane sugar per acre is the greatest in the world. About half the acreage planted to cane is irrigated. The development of the sugar industry on a large scale dates from 1875, when the Reciprocity Treaty, passed in that year, established practically free trade between the islands and the United States. The greater number of sugar farms are on the islands of Hawaii, Oahu, Maui, and Kauai, at the bases of mountains. Rice is the second crop in value. It is consumed chiefly on the islands and is raised on the lowlands, chiefly by Chinese, in terraces flooded with water. There is little additional land available for this crop, but there is much room for improvement in the method of cultivation. Some improvements have been made chiefly as the result of the work of the Federal experiment station. The acreage planted to rice in 1909 was 9425 and the amount produced was 41,827,900 pounds, valued at \$1,068,293. The yield is about 2½ tons per acre per annum (two crops). A small quantity of rice is exported to the United States. This in 1913 amounted to 3,520,667 pounds, valued at \$185,938.

The growing of coffee was at one time carried on to a large extent in the islands. Its cultivation began as early as 1817 and was at one time conducted largely by Americans. Owing to competition with other countries and the consequent lowering of prices, coffee growing has now fallen largely into the hands of the Japanese. The out-



HAWAII

SCALE OF STATUTE MILES
0 10 20 30 40 50 60
SCALE OF KILOMETERS
0 20 40 60 80 100

Important towns are shown in heavy face type
Railroads shown thus
Steamship Lines
Submarine Telegraph Lines

Scale of Miles
0 1 2 3

D Longitude 157° West from E Greenwich 155°

put varies from year to year and is never large. In 1909, 3727 acres were planted to coffee, and the product was 9,834,026 pounds, valued at \$213,085. It is almost entirely consumed in the islands.

The growing of pineapples has become of great and increasing importance, and a new product of this industry is the preparation of the juice of pineapples put up in bottles. This product has found a ready sale in the United States. The output of canned pineapples increased from 1200 cases of two dozen cans each in 1900 to 510,000 cases in 1909. In 1910 there were invested in the industry more than \$2,000,000, and about 6000 acres were under cultivation. In 1913 the canned pineapple exported to the United States was valued at \$4,054,711. The tobacco and cotton industries are being developed and give promise of being important. Some of the tobacco is of a high grade, especially for wrappers. In 1912 there were four plantations under tobacco, and the output in that year was 104,000 pounds, valued at \$49,500. During the same year a cigar factory was established and the manufacture of cigars was begun. The principal varieties of cotton grown are the Sea Island, Caravonica, and Egyptian. The production has been small, in 1909 amounting to only 5500 pounds. In addition to pineapples other fruits are grown. The most important of these are bananas, papaya, limes, oranges, and breadfruit. The total value of the fruits exported to the United States in the calendar year 1913 was \$4,268,020. Grapes and orchard fruits are produced in small quantities. One of the most promising of the newer industries is the growing of Bermuda onions. A superior quality of sisal hemp is produced, and rubber trees have been planted with some success.

Live Stock and Dairy Products. The livestock industry is important, but most of the meat is consumed in the Territory. In recent years there has been a reduction in the number of cattle, but a corresponding increase in weight and a reduction in the maturing age from about four years to about three years or less. On account of disease and the overstocking of ranges the number of sheep has also fallen off. The Oriental population consumes large quantities of pork. The quality of the live stock has been greatly improved by the importation of fine breeds. The total value of the milk, cream, and butter sold in 1909 was \$215,481. The poultry of all kinds in 1910 numbered 95,667.

Forest Reserves. The United States Government has set aside a considerable area of public land for forest reserves. There were, in 1913, 30 reserves covering 689,261 acres. With the addition of reserves covering a little over 100,000 acres the forest-reserve system of the Territory will be practically completed. Tree planting is conducted on a large scale. In the calendar year 1912, 1,303,698 trees were planted, compared with 1,134,940 for the preceding year.

Irrigation. A large proportion of the sugar farms require irrigation to produce satisfactory results. Water is obtained by pumping from artificial wells and by conducting surface water through tunnels and ditches.

Mineral Resources. There are no large deposits of important minerals. It is not to be anticipated that useful mineral products will ever be of great importance relatively in the Hawaiian Islands, as they are limited both in kind and in quantity. Although the actual num-

ber of mineral species is quite large and corresponds to those of similar volcanic areas, the greater number of them are merely mineralogical specimens, rather than available for commercial purposes. It must not be understood, however, that the mineral wealth of Hawaii is wholly insignificant. On the contrary, there is an apparent field for considerable development. Among the minerals noticed are sulphur, pyrite, common salt, sal ammoniac, limonite, quartz, chrysolite, garnet, labradorite, feldspar, soda alum, copperas, Glauber salt, nitre, and calcite. The Hawaiian volcanoes have been natural laboratories, working on an almost unprecedented scale, with a strong decomposing agency of acid steam, high temperature, rainfall, and perhaps sea infiltration, so that secondary decomposition products are numerous and common. Many of the minerals identified have no economic significance, while others occur too sparsely to be properly utilized. As in other volcanic localities and island resorts much frequented by travelers and health seekers; there is a considerable trade in specimens and curiosities of the two extreme types of products, the volcanic and the marine. These consist of minerals and fantastic lava formations from the craters and coral and shells from the shores and sea.

Sulphur is found in large quantities in the craters and upper slopes of the volcanoes. Very large deposits of gypsum, some of it almost pure, exist in the islands. Mineral paints, especially red ochre and yellow ochre, are abundant. There is an abundance of building stone in the islands, but the climatic conditions and mode of life do not call for large stone construction. Large pockets of kaolin have been found, and it is believed that there are workable quantities of this mineral in the islands. An industry of local importance is the gathering of sea salt from accumulations formed by the natural concentration and evaporation of sea water. Pearls have been found, but a productive industry of commercial importance remains to be established.

Manufactures. Manufacturing industries which have not been called into being by the agricultural products of the islands exist for the production or repair of articles of local consumption. In 1909 there were 500 manufacturing establishments, which gave employment to an average of 7572 persons during the year and paid out \$2,795,000 in salaries and wages. Of the persons employed, 5904 were wage earners. The products turned out by these establishments were valued at \$47,404,000, and materials costing \$25,629,000 were consumed. Thus, the value added by manufacture was \$21,775,000, which represents the net wealth created by manufacturing operations during the year. The table on page 4 gives the most important data relating to the manufacturing industries of the Territory in 1909 in comparison with 1899. (The industrial census of 1904 did not include the Hawaiian Islands.)

From this table it will be noted that the industries of Hawaii as a whole showed a marked development during the decade. This was due in part to the impetus given to manufacturing industries by annexation to the United States. During this period the number of establishments increased 125.2 per cent and the average number of wage earners increased 61.5 per cent, while the value of products increased 103 per cent and the value added by manufacture 96.1

per cent. It will be noted that the manufacture of sugar is by far the most important industry. Cane sugar alone is produced, although experiments in growing sugar beets indicate that this industry may secure a foothold. Although the sugar industry greatly preponderates, it also exerts a powerful effect on other industries. Exclusive of sugar, the value of the manufactures increased from \$4,099,000 in 1899 to \$11,454,000 in 1909, or 179.4 per cent. Nearly all the sugar manufactured is exported to the United States. The cleaning and polishing of rice is the industry second in importance. With the exception of some of the larger mills in and near Honolulu, this industry is carried on by

As noted below, the wage earners in all the industries of the Territory numbered 5904. Of these, 5401 were males and 503 females. The wage earners under 16 years of age numbered 62.

Honolulu is the only large city in the island, and, in 1909, 22.6 per cent of the total value of products was made in that city and 41.2 per cent of the average number of wage earners were employed there. From 1899 to 1909 there was a more rapid increase in Honolulu than in the districts outside. The relatively large number of establishments in Honolulu is due, however, to the fact that in this city are found many of the poi shops, bakeries, tin shops, and less important industries.

COMPARATIVE SUMMARY FOR 1909 AND 1899

THE TERRITORY — ALL INDUSTRIES COMBINED AND SELECTED INDUSTRIES

INDUSTRY	Census	Number of establishments	Wage earners (average number)	Primary horse power	Wages	Value of products	Value added by manufacture
					Expressed in thousands		
All industries	1909 1899	500 222	5,904 3,655	41,930 19,590	\$2,109 1,473	\$47,404 23,354	\$21,775 11,103
Boot and shoe shops	1909 1899	14 14	81 39	4	17 11	126 47	48 27
Bread and other bakery products	1909 1899	46 8	107 4	38	36 1	344 10	124 5
Carriages and wagons and materials	1909 1899	17 7	68 51	25 37	33 33	116 106	60 56
Coffee and spice, roasting and grinding	1909 1899	4 4	28 17	33 29	4 4	50 38	14 12
Coffee, cleaning and polishing	1909 1899	5 6	71 47	237 140	12 9	297 95	46 35
Copper, tin, and sheet-iron products	1909 1899	12 12	80 36	18	33 22	304 91	133 53
Food preparations	1909 1899	87 27	172 82	41 28	36 17	341 62	146 37
Ice, manufactured	1909 1899	5 4	40 19	271 204	24 12	107 57	86 41
Lumber and timber products	1909 1899	8 3	254 35	805 205	110 22	281 91	184 49
Mineral and soda waters	1909 1899	22 7	83 35	114 10	35 11	194 89	120 64
Printing and publishing	1909 1899	37 10	319 132	117 55	147 22	435 200	337 167
Rice, cleaning and polishing	1909 1899	74 41	138 173	1,428 609	36 49	2,239 664	638 182
Saddlery and harness	1909 1899	6 7	14 21	6 16	49 78	21 31
Sugar	1909 1899	46 44	2,517 2,369	36,426 17,774	781 748	35,950 19,255	17,408 9,477
All other industries	1909 1899	117 28	1,932 595	2,373 499	799 496	6,571 2,471	2,404 867

Chinese and Japanese. Practically all rice milled in the islands is consumed locally, being in great demand among the Chinese and Japanese, who constitute about one-half of the population. As noted in the paragraph on *Agriculture*, the canning and preserving of pineapples has become an industry of great importance in recent years. Since 1895, when this industry was first known, it has shown a steady growth. It was not important enough, however, in 1899 to be shown separately in the census figures.

Transportation. The Territory is peculiarly dependent for its progress upon the development of transportation facilities. It is isolated in the mid-Pacific and is subdivided into a number of islands that are both mountainous and possess comparatively few good natural harbors. Transportation includes interisland traffic, traffic between the Territory and the United States and Mexico, and transpacific traffic, making Hawaii a point of call. Interisland traffic is conducted chiefly by the Interisland Navigation Company,

which has a fleet of about 20 steamers. During 1913 this company carried 84,493 passengers and approximately 429,134 tons of freight. In 1913-14 the company constructed a modern pontoon floating dry dock.

Traffic is carried on extensively between Hawaii and the Atlantic and Pacific coasts of the United States and Mexico. The bulk of the traffic with the Atlantic coast is carried by the American-Hawaiian Steamship Company, which entered the Hawaiian trade in 1901 and has grown rapidly. The bulk of the trade with the Pacific coast is handled by the Matson Navigation Company and has also developed rapidly. The Oceanic Steamship Company in 1913 operated one passenger and one freight steamer between Honolulu and San Francisco on a four-week schedule. The Associated Oil Company operated several steamers and sailing vessels from Hawaii to the Pacific coast. In addition to this service there are several steamship lines whose vessels call regularly at Honolulu on their voyages between San Francisco and the Philippines. These include the Pacific Mail Steamship Company, the Toyo Kisen Kaisha, a Japanese company, and the Canadian-Australian Royal Mail Line.

The most important steam railroad in the islands is a line on the island of Oahu. It had in 1913 about 113 miles of road, extends along the coast from Honolulu to the north end of the island, and has a branch with subbranches between the two ranges of mountains which constitute this island. It connects with more than 100 miles of private railroads on sugar plantations. On the island of Hawaii, the Hilo Railroad Company operates the principal road. This is the only standard-gauge road in the Territory and its line is about 90 miles in length. The only street railway in the Territory is in Honolulu and is an unusually well-equipped and well-conducted line.

For several years the United States government has been making extensive improvements in the harbors, notably at Pearl Harbor, which now constitutes a naval station. Here a dry dock was in process of construction in 1913. When the proposed improvements are completed it will be one of the most important naval stations in possession of the government. The harbor of Honolulu, although the main port of the Territory, is small and requires constant enlargement. The Federal government since the annexation of the islands has carried on improvements here. A breakwater was in process of construction on the island of Hawaii at Hilo in 1912, and other harbor improvements in the Territory were under construction in 1913.

The Territory has been connected by cable with both shores of the Pacific for many years. Hawaii was one of the first countries to install the wireless system, and in 1914 several services of this nature were in extensive use for inter-island communication. Wireless communication with California has also been carried on successfully, and on the island of Oahu are two powerful stations used by the Marconi Telegraph Company for its transpacific wireless service. Each of the five largest islands has an extensive telephone system. There were, in 1913, 6488 telephone stations and 5714 miles of wire.

Commerce. Imports and exports for the fiscal year ending June 30, 1913, exclusive of specie, aggregated \$80,991,456. This was a decrease of \$4,446,120 from the amount in the

preceding fiscal year. The decrease was entirely in exports to continental United States, and was due to low prices and a shortage in the sugar crop on account of drought. This more than offset the large increases in imports both from continental United States and from foreign countries and in exports to foreign countries. The imports amounted to \$36,002,940, an increase of \$7,308,618 over those of the preceding year. Those from continental United States amounted to \$29,129,409, an increase of \$6,033,531, and those from foreign countries amounted to \$6,873,531, an increase of \$1,275,087. From 1907 to 1913 the imports from continental United States more than doubled. The exports in the fiscal year 1913 amounted to \$43,471,940, a decrease of \$11,977,498. Those to continental United States amounted to \$42,713,294, a decrease of \$12,362,871, while those to foreign countries amounted to \$758,646, an increase of \$385,373. The imports from the United States for the fiscal year ending June 30, 1914, amounted to \$25,571,569. Of these the most important were manufactures ready for consumption, which amounted in value to \$15,552,992. The other imports of most importance were chiefly foodstuffs. The exports to the United States for the fiscal year ending June 30, 1914, amounted to \$40,628,200. Of this, sugar, raw and refined, was valued at \$33,187,920. Fruits and nuts were valued at \$4,780,583; canned pineapples, \$4,536,919. The exports of Hawaii to foreign countries in the fiscal year 1914 amounted to \$902,985, and the imports from foreign countries amounted to \$6,282,558. The largest value of imports was from Japan, \$2,516,463; from British India, \$950,304; from Germany, \$696,197; from Chile, \$332,310; from Australia and Tasmania, \$569,287. The largest value of exports was to the Philippine Islands, \$517,978.

Finance. The net receipts for the fiscal year 1913 amounted to \$4,247,701, and the net disbursements to \$4,208,389. The net receipts exceeded the net disbursements by \$39,311. The net cash balance at the close of the year was \$660,720, compared with \$621,409 at the close of the fiscal year 1912. The principal receipts are from property taxes and land sales and harbor, wharf, and pilot revenues. The most important disbursements are for interest on the bonded debt, general expenses, the support of Territorial institutions, government, and the maintenance of public health. The bonded debt of the Territory at the beginning of the fiscal year was \$5,454,000, which was increased during the year by the issue of \$1,500,000 of 4 per cent public-improvement bonds, and decreased by a payment of \$110,000, leaving the total bonded indebtedness at the end of the year \$6,844,000. This was 3.9 per cent of the assessed value of property. The limit of the aggregate indebtedness is fixed by the organic act as 7 per cent of such assessed value, and the limit of the amount that may be incurred in any one year was fixed at 1 per cent. The bonds issued have been for public improvements, public-school buildings, improvements on roads, etc.

Population and Immigration. The population of the islands is extremely heterogeneous and has changed greatly in character as a result of the immigration of different races. There is no definite knowledge as to the population in early times. In 1778 Captain Cook placed the number at 400,000, but this is considered gener-

ally to be about a fourth too large. The native population has decreased rapidly from the time of the first acquaintance of Europeans with the islands. While the cause of this decline has never been fully understood, prominent among the reasons is the introduction of foreign diseases to which natives are peculiarly susceptible. The birth rate of the islands is also small. These conditions indicate that the practical extinction of the race is only a matter of time. While the Hawaiians have been indisposed to intermingle freely with other races, there is a small number of "part Hawaiians." Marriages between the natives and Chinese are quite common, but the Japanese have shown an aversion to mixed marriages. The population of the islands at each census from 1832 to 1910 inclusive has been as follows: 1832, 130,313; 1836, 108,579; 1850, 84,165; 1853, 73,138; 1860, 69,800; 1866, 62,959; 1872, 56,897; 1878, 57,985; 1884, 80,578; 1890, 89,990; 1896, 109,020; 1900, 154,001; 1910, 191,909. The population on June 30, 1913, was estimated at 217,744, an increase of 25,835, or 13.46 per cent, since 1910. The large increase in the population in recent years is the result of the immigration of foreign laborers. In 1910 the pure Caucasian element in the population numbered 44,048, constituting 23 per cent, or a little over one-fifth. In the decade 1900-10 the number of Caucasians increased 15,229, or 52.8 per cent, the percentage of increase for this race being practically the same as in the preceding decade. The increase of the Japanese in the decade 1900-10 was 18,564, or 30.4 per cent. In the same period the Chinese decreased 4093, or 15.9 per cent. The following table shows the distribution of the population in 1900 and 1910.

	1900	1910
Hawaiians.....	29,787	26,041
Part Hawaiians.....	7,848	12,506
Caucasians.....	26,252	44,050 *
Chinese.....	25,762	21,674
Japanese.....	61,115	79,674
All others.....	3,237	7,904
Total.....	154,001	191,909

* Includes 22,303 Portuguese, 1990 Spanish, and 4890 Porto Ricans.

The only races which showed a decrease in the three years from 1910 to 1913 are the pure Hawaiians through an excess of deaths, and the Chinese through the excess of departures. The largest increase during these three years was in the number of Filipinos, they having been introduced by the Hawaiian Sugar Planters' Association; the Spanish, introduced by the Territorial government; other Caucasians, chiefly Americans, who came in large numbers, many of them in the military forces of the United States; and part Hawaiians, Portuguese, and Japanese, mainly through an excess of births. The Territory in 1913 introduced 2413 Spanish and 228 Portuguese. There were also introduced 65 Russians. From 1907 to 1913 the Territorial authorities introduced 7695 Spanish, 5196 Portuguese, and 2121 Russians, a total of 15,012, of whom 5399 were men, 3644 women, and 5969 children. Early attempts were made in the history of the industrial development of the islands to introduce Polynesians, but these did not result satisfactorily. Since the acqui-

sition of the islands by the United States, the laws for the exclusion of Chinese laborers have been in effect, and this source of labor has been closed. The large influx of Japanese labor was also ended by the agreement between the governments of the United States and Japan, made in 1906, as a result of agitation over Japanese labor in California. The Japanese government agreed to permit the emigration only of laborers having passports. In recent years the sugar planters have to a large extent substituted Filipinos for Japanese and Chinese labor. During 1913 there were introduced 5747 Filipinos, and from 1909 to 1913, 13,715 Filipinos. The percentage of non-Asiatic labor employed on the sugar plantations increased from 12.30 from the organization of the Territorial government to 37.15 in 1913.

Immigration is divided into two classes, unassisted and assisted. The assisted immigration includes that induced to come to the Territory by the Department of Immigration and Labor and by the Hawaiian Sugar Planters' Association. Unassisted immigration includes that of Americans from the mainland of the United States. The problem of securing labor in the islands is a serious one, and efforts have been made as noted above to obtain laborers from European countries, especially from Portugal and Spain, from Russia, Manchuria, and Siberia. During the five years ending 1912, 5306 laborers from these countries were induced to come to Hawaii. During 1912, however, the introduction of Russians from Manchuria was discontinued.

The population of the several islands in 1910 was as follows: Oahu, 81,993; Hawaii, 55,382; Maui, 28,623; Kauai, 23,744; Molokai, 1791; Lanai, 131; Niihau, 208; Kahulau, 2.

Banks. There were, in 1913, 17 banks in operation in the Territory. One of these was a savings bank, two were commercial banks, and the others both commercial and savings. There were four national banks. The aggregate deposits on Dec. 31, 1912, amounted to \$17,026,297. The commercial deposits amounted to \$11,041,901, and the savings deposits to \$5,384,395. The deposits in the savings banks numbered 18,787, which is nearly 10 per cent of the population, the Japanese having the largest percentage of the population depositing in savings banks, 41.52.

Ethnology. The indigenous inhabitants of the Hawaiian Islands are, in physique, good representatives of the Polynesian race, rather tall, and often quite good-looking. In head form they have a tendency towards brachycephaly. In language the Hawaiians are most nearly related to the Marquesans and Tahitians. The narratives of settlement of Polynesian folk upon these northern islands are ample proof of three migration streams. The earliest was that of a fleet of proto-Samoans direct from Samoa. This was succeeded by a Tongaliti migration by way of the Marquesas. The last migration, that which established the social system of the Hawaiians as existing when they were discovered, was from Tahiti; this was not merely a wandering, but intercourse between Tahiti and Hawaii was maintained for several generations. In mental ability and artistic genius the Hawaiians rank high among their kindred, as their advanced governmental institutions, their assimilation of foreign culture, their industrial and artistic manufactures (kapa printing, straw plaiting, feather

weaving, etc.), and their development of a literature amply demonstrate. It was upon one of the peculiarities of the Hawaiian family system, the *punulua*, best comprehended as a survival of polyandry, that Morgan (1871-77) based his second stage in his scale of evolution of the family, the "*punuluan* family." From the older culture the *Kahuna* beliefs, the *hulahula* dances, etc., have survived.

Religion. With a population representing so many races, there is naturally a variety of religions. The great activity of the early missionaries succeeded in bringing the native population within the fold of the Christian Church. However, the Christian faith is oftentimes lightly held, and their old-time pagan practices are sometimes secretly indulged in. The native Protestant following is nearly twice that of the Roman Catholic, the Mormons among them numbering about 4000. The Portuguese are mainly Roman Catholic, but most of the other European and American elements represented are Protestant. The Chinese and Japanese hold generally to their Oriental faith.

Education. Schools were established in Hawaii as one of the earliest results of missionary effort. The first constitution, adopted in 1840, provided for schools in districts wherever 15 or more children suitable to attend school lived close together. Enactments have been made in recent years which have greatly increased the efficiency of the administration of schools, particularly by the Legislature of 1911. Universal education is free and compulsory. Every child between the ages of 6 and 17 is obliged to attend either a public or a private school. The general character of the educational system has continued to be American as a result of foundations laid by American missionaries. As a result of legislation passed in 1911, the public schools were placed largely on an automatic adequate financial basis. During 1913 there was expended for the maintenance of public schools \$677,799, compared with \$630,334 during 1912 and \$479,351 in 1911. Of the expenditure in 1913, \$634,434 was contributed by the Territory out of current revenues. Of this \$569,334 was for teachers' salaries and \$46,319 for other expenses, including school supplies, furniture, books for school libraries, etc. The cost and maintenance of the public schools was \$26.44 per pupil in 1913, as compared with \$26.53 in 1912. The Legislature of 1911 provided for new buildings, chiefly out of loan funds, while that of 1913 provided for other buildings, chiefly out of current revenues.

The number of all schools in the islands in 1913 was 212. Of these 161 were public schools and 51 were private schools. The teachers in all schools numbered 986, and public schools 674. Of the teachers, 238 were males and 748 females. There is a normal school at Honolulu, and in 1907 the Legislature established a College of Agriculture and Mechanic Arts at Honolulu. In 1913 permanent quarters for this college were completed. There is a high school in Honolulu and a seminary on the island of Maui. There is also an industrial school at Waialea on the island of Oahu, which was founded in 1902. Oahu College, founded in 1852, offers advanced courses of study. It is well equipped with buildings and apparatus and has a considerable endowment.

Charities and Corrections. The correctional institutions of the Territory include the prison at Honolulu, two reform schools, to which boys

and girls respectively are committed by the juvenile courts, and the local jails. In 1913 plans were completed for new buildings for the prison. For a discussion of the care and aid given to lepers, see the section *Public Health and Sanitation*.

Public Health and Sanitation. The matter of public health in the Territory is of peculiar importance and has called for more attention than almost any other on the part of the government in recent years. The powers of the Board of Health have been greatly extended by the Legislature. Most of the work is done through the Territorial Department of Public Health, but more or less is done also by the local governments. There is close cooperation between the Territorial health officers and those of the United States Public Health Service. The most important institutions are those having to do with leprosy. New methods have been adopted in dealing with this disease in recent years. There were in 1913 four institutions—the leper settlement on the island of Molokai and the leper hospital and the homes for nonleprous boys and girls respectively of leprous parents at Honolulu. At the close of 1913 there were 726 lepers in the islands. Of these 444 were males and 282 females; 606 were Hawaiians and part Hawaiians, 47 Portuguese, 38 Chinese, 13 Japanese, 5 Germans, 3 Americans, and 14 scattered among other races. For a further discussion of this disease in its connection with Hawaii, see *LEPROSY*. The natives of the islands are peculiarly susceptible to tuberculosis, and the campaign against this disease has been carried on with success, particularly on the islands of Oahu and Hawaii.

War has been waged against rats as a result of bubonic plague. From 1910 to 1913 no case of this plague occurred in Honolulu, but, owing to the prevalence of this disease in the Orient, it is necessary to take preventive measures. During 1913 there were seven cases of bubonic plague in Hamakua and one in south Hilo. In these districts in the year mentioned 137,581 rats and mongooses were killed, of which 20 were found to be infected with plague.

Government. The form of government is territorial and is carried on by the provisions of an Act of Congress passed in 1900. This Act organized the islands into a Territory of the United States. There is a Territorial Representative in Congress.

Executive.—The executive power of the Territory is lodged in a governor, holding office for four years, who is appointed by the President. He must be at least 35 years of age and be a citizen of the Territory. The other executive officer is the Secretary, who is also appointed by the President for the same term as the Governor. With the consent of the Senate the Governor appoints an attorney-general, treasurer, commissioner of public lands, commissioner of agriculture and forestry, superintendent of public instruction, superintendent of public works, auditor, a high sheriff, and members of the various boards and commissions which carry on the routine of the government.

Legislative.—The Legislature consists of the Senate and House of Representatives. The Senate is composed of 15 members and the House of 30. There are four senatorial districts, in which two, three, four, and six Senators respectively are elected, viz., seven at one biennial election and eight at the next; and six repre-

sentative districts, in each three of which four Representatives are elected, and in each of the other three of which six Representatives are elected. The Senators hold office for four years and the Representatives for two.

Judiciary.—The Territorial courts comprise a supreme court of 3 members, 5 circuit courts, of which one has 3 members, who sit separately, and the others 1 member each, and 29 district courts. The supreme and circuit court judges are appointed by the President, and the district judges by the Chief Justice of the Territorial Supreme Court. The circuit courts are the courts of general, original jurisdiction. They try law, equity, probate, and divorce cases. The first circuit court acts also as a court of land registration. The circuit and district courts act also as juvenile courts, the principal juvenile court being presided over by one of the judges of the first circuit court. Entirely distinct from these Territorial courts there is a United States district court, with the jurisdiction also of a United States circuit court. This court has two district judges.

Suffrage and Elections.—An Australian ballot act and a corrupt-practices act were passed early in the history of the Territory. The Legislature of 1911 substituted permanent registration for a special registration of voters. In 1913 the Legislature passed measures prohibiting corporations from contributing funds directly or indirectly for political purposes, and in the same year a direct-primary law was enacted. This is somewhat similar to the Berkeley system of double elections. Any candidate who receives the votes of a majority of the registered voters at the first election is declared elected, and no second election is held during office. If no candidate receives such majority, the party candidates who receive the largest votes of their respective parties and the nonpartisan candidates who receive the votes of at least 20 per cent of the registered voters are the candidates for the second election.

City and County Government.—Local governments in Hawaii were established on July 1, 1905, when the Territory was divided into four counties, one of which, that comprising the island of Oahu, was converted, on Jan. 21, 1909, into a city and county, to be known as the city and county of Honolulu. There is nominally a fifth county, the small one comprising the leper settlement. This, however, is governed by a board of health. Local government has steadily developed since its beginning.

History. Peopled probably from the Polynesian Islands, the Hawaiian Islands when first known to white men had passed through the first stages of savagery and were progressing towards civilization. The particular stage which it had reached was that of feudalism. Instead of a heterogeneous collection of tribes there were in the eighteenth century as many kings as there were inhabited islands in the group, and in the island of Hawaii there were at least two kings. The people held the land which they tilled in tenancy to a class of middlemen, or gentry, who served subordinate chiefs, who were themselves under the control of the dukes or high lords, who owed allegiance to the king. The land was held in military tenure. Society was highly organized into orders, religious and social, with a system of checks, by means of laws and ceremonies. The whole tendency of political movement was towards centralization.

The first white men in Hawaii were the survivors of the crews of two Spanish vessels which were wrecked on the islands as early, possibly, as 1527. They intermarried with the natives, and their descendants, recognized by their Caucasian characteristics in complexion and features, are known to this day at Kekeka. Gaetano in 1555 made a landfall here, but it was reserved for Capt. James Cook (q.v.), while on his third voyage in the Pacific, to find this group in 1778. After returning from Bering Strait, to pass the winter in Hawaii, he came into conflict with the natives and in a quarrel lost his life. His estimate of the population at 400,000, though an undoubted exaggeration, shows that the group was densely inhabited. Cook named the group Sandwich Islands, after John Montagu, the fourth Earl of Sandwich (1718-92). In 1790 Kamehameha, one of the kings of the main island, started to bring the whole group of islands under his sway; but with ordinary weapons it is uncertain whether he could have succeeded. Aided by firearms derived from the American whalers and by the construction of a navy (the natives having learned shipbuilding from Vancouver), Kamehameha succeeded in consolidating the group of islands under his rule. He confiscated all the land and declared it to be his estate and let it out again on terms of direct personal fealty to him. At the beginning of the nineteenth century the fur trade on the Pacific coast received a tremendous impulse as a result of the epoch-making expedition of Lewis and Clark. Spending the winter in the Sandwich Islands, the American shipmen dressed their furs and bought the sandalwood then so abundant in the islands.

This trade in sandalwood enriched the chiefs and kings, but especially Kamehameha, who thus secured the sinews of war by sending his people all over the island to cut and transport the fragrant wood, which he traded for vessels, arms, ammunition, and military stores. He died May 8, 1819, and his oldest son, Liholiho, succeeded him, under the title of Kamehameha II, though the real power behind the throne was an "empress dowager," the widow of Kamehameha I. Under the old religious system of taboo (q.v.), which represented conservatism, a class of men corresponding to the "literati" of other lands existed who were more or less hostile to change and especially to centralization. The new King, advised by his Premier, the widow of Kamehameha I, abolished by decree the hoary system of taboo. This bold reform met with organized resistance, and in the appeal to arms a bloody battle was fought. The conservatives were overthrown, and the iconoclasts went through the islands smashing and burning the idols, or tossing them into the sea. Thus the Hawaiians were a people without a religion. At this juncture of affairs Christian missionaries from the United States arrived. More than 10 years before, native Hawaiians, serving as sailors on American ships, had stirred the generous impulses of New England, and one of the first missionary companies sent out by the American Board of Commissioners for Foreign Missions, seven married men with their wives, reached Honolulu April 4, 1820. The King and his Queen made a voyage to England in 1823 and died there in 1824. This event put fresh power into the hands of the widow of Kamehameha I, who governed the kingdom for nine years, until the younger brother of the deceased King reached his majority and reigned as

Kamehameha III. The Ten Commandments were adopted as a basis of laws in 1825, and other criminal laws were enacted in 1827 and 1829. In 1840 the King and his nobles promulgated a constitution granting civil rights to the people. In 1848 he abolished the last relics of feudalism by approving the Land Act, which yielded up the crownlands and provided for the people becoming owners of the soil. Captain Paulet, a British naval officer, in 1843 demanded that Hawaii declare her allegiance to Great Britain, which was done. But in a few months the independence of Hawaii was recognized by England as well as by all other nations. In 1848 an epidemic of measles broke out and in the next few years carried off approximately a tenth of the people. Throughout the first half of the century a force for evil was the group of dissolute ship deserters who encouraged debauchery and licentiousness, and who opposed the efforts of the missionaries and the better class of whites to improve conditions. In 1852 the constitution was revised by the King, and the Legislature and universal suffrage were established. Dying on Dec. 15, 1854, Kamehameha III was succeeded by Alexander Liholiho, son of Kinau, the daughter of the founder of the dynasty. This prince assumed the title of Kamehameha IV. After reigning nine years, honored because of his perseverance in the principles of civilization, he died Nov. 30, 1863, and was succeeded by his brother Lot, as Kamehameha V. During his reign Honolulu became a beautiful modern city, and business and commerce prospered greatly. Nevertheless the new ruler was a reactionary. He forcibly abrogated the national constitution and issued another, in which the right of suffrage was limited by a property qualification. When he died, Dec. 11, 1872, without issue, the direct line of Kamehameha became extinct. After four weeks' government by the cabinet, the Legislature elected the nominee of the people, Lunalilo, as king. He attempted in vain to restore the old constitution. His short and troubled reign of one year ended Feb. 3, 1874.

Lunalilo died childless, and the Legislature again proceeded to elect a king, and on Feb. 12, 1874, chose David Kalakaua, though their action was violently opposed by Emma, the Queen Dowager. In the riot which broke out between her partisans and the legislators several persons were injured. The warships in the harbor under the British and American flags landed marines and sailors, order was restored, and the King began his reign. Kalakaua visited the United States in 1874, and in 1875 a reciprocity treaty was arranged between that country and Hawaii. This was renewed in 1887. The King made a tour of the world in 1881. Kalakaua sought to govern personally and was wasteful in his expenditures, was personally corrupt, and stirred up religious bitterness. The patience of the better elements of society being exhausted, the party of progress at a mass meeting held June 30, 1887, demanded from the King a new constitution and better government, with a cabinet under the control of the Legislature. Although Kalakaua agreed to the demand and signed a new constitution, which was ratified by the vote of the people, he lost no opportunity to regain his power. In this course he was encouraged by his sister, the Princess Liliuokalani. On the King's attempting in 1889 to overthrow the new government, the progressive party reorganized, and a skirmish occurred in which the royal partisans

were defeated. On Jan. 20, 1891, Kalakaua died in San Francisco. His sister, Liliuokalani, became Queen. Her reign was marked by continual evasions and nullification of the constitution and attempts to secure absolute power. The Queen granted opium and lottery monopolies. The men of the progressive party, consisting chiefly of Americans and the better elements among the foreigners and natives, were fully acquainted with her determination to promulgate a new political instrument which would enhance the royal power; but just when she was about to bring her plans to consummation they dethroned the Queen and organized a provisional government. The Committee of Thirteen, Jan. 15, 1893, passed a resolution "that it is the sense of this committee that, in view of the present unsatisfactory state of affairs, the proper course to pursue is to abolish the monarchy and apply for annexation to the United States." The Queen's ministers appealed for help to the foreign legations, while the leading citizens of the town were openly and publicly preparing to abolish the Queen's government by force of arms. The United States Legation was in close touch with the best element both of the Americans and of the native Hawaiians. Realizing the great significance of the revolution and the importance of the interests of his country, that were involved, the United States Minister, John L. Stevens (q.v.), had a force of 140 sailors and marines landed from the U.S.S. *Boston*, for the protection of American interests, and at once recognized the provisional government on behalf of his own. Commissioners were sent to the United States to negotiate a treaty of annexation, while Minister Stevens, believing that this small state was not safe from aggression, on his own responsibility declared Hawaii under the protection of the United States, Feb. 16, 1893. President Harrison submitted to Congress a treaty of annexation, but upon the accession of President Cleveland the treaty was withdrawn, the Minister's action disavowed, and a special commissioner, Mr. Blount, was sent to the islands to report upon the situation. The commissioner's report represented that the action of Mr. Stevens had been unwarranted, and that it was the landing of the United States seamen that made the success of the revolution possible. The disposition of the United States government appearing to be favorable to the deposed Queen, negotiations were entered upon for her restoration; but her refusal to grant a general amnesty made it impossible to support her pretensions. Thrown upon its own resources, Hawaii was proclaimed a republic July 4, 1894, and duly organized, with Sanford B. Dole as President, and a Legislature of two chambers. In 1895 a monarchist revolt broke out, which was easily suppressed, and Queen Liliuokalani formally abdicated. The political excitement that had made the annexation question a disturbing one in the United States having subsided, and the Republican party being again in power, the government of Hawaii, then firmly established, renewed negotiations for annexation in 1898.

In accordance with a resolution of Congress, passed July 7, 1898, the Hawaiian Islands were formally annexed Aug. 12, 1898. By the Act of Congress of April 30, 1900, all persons who, on Aug. 12, 1898, were citizens of the Republic of Hawaii were declared to be citizens of the United States and of the Territory of Hawaii. On June 14, 1900, Hawaii was organized as a

Territory, with ex-President Dole as the Territorial Governor.

The political history of the Hawaiian Islands from their creation into a Territory of the United States has been singularly uneventful, in decided contrast with the troubled conditions which prevailed previous to that time. The chief problem has been in connection with immigration and labor. This is discussed fully in the paragraph *Immigration and Labor* above. Mr. Dole continued to serve as Governor until 1904, when he was succeeded by George R. Carter, who served until 1907. In February, 1909, the United States government decided to establish a large military station at Hawaii and make it second only to the Department of the Philippines in importance. On May 27, 1910, President Taft approved an Act passed by Congress which in many important essentials amended the organic act of the Territory. It provided for increases in the salaries of a number of the executive and judicial officers and of members of the Legislature; it settled doubts as to the applicability of various Federal laws to Hawaii by providing that such laws, which purport to relate to all Territories, shall not apply to Hawaii, the provisions of its organic act being deemed sufficient; it settled doubts also as to the powers of the Legislature with reference to appropriations and also to the validity of numerous naturalization laws made by the circuit courts; it improved in several respects the law relating to the disqualification of judges; it authorized the restoration to the Territory of land set aside but no longer needed for Federal purposes. The principal features of the act, however, were the provisions making changes in the land laws. (See *Agriculture*, above.) In 1912 the contract for the dredging of the Pearl Harbor Channel was completed, and the harbor was entered for the first time by a large war vessel, the *California*, the flagship of the Pacific fleet. The Legislature of 1913 enacted measures providing for direct primaries and elections, the merit system in certain services, the prohibition of political contributions by corporations, separate county and Territorial elections, county elections at large instead of by districts, shortening the ballot, and further adjustment of the relations between the Territorial and local governments and the development of the latter. The same Legislature provided for a public-utilities commission with extensive power over public utilities of all kinds. In July, 1913, L. E. Pinkham was appointed Governor of the Territory to succeed W. F. Frear, who had served from 1907. The rulers of the monarchy and the chief officials of the republic of the Territory have been as follows:

SOVEREIGNS

Kamehameha I.....	1795-1819
Kamehameha II.....	1819-1824
Kaahumanu (Regent).....	1824-1832
Kamehameha III.....	1832-1854
Kamehameha IV.....	1855-1863
Kamehameha V.....	1863-1872
Lunalilo.....	1873-1874
Kalaka'aua.....	1874-1891
Liliuokalani.....	1891-1893

PRESIDENT

Sanford B. Dole.....	1893-1898
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TERRITORIAL GOVERNORS

Sanford B. Dole.....	1898-1904
George R. Carter.....	1904-1907
W. F. Frear.....	1907-1913
L. E. Pinkham.....	1913-

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HAWARDEN, hîr'den. A market town in Flintshire, Wales, 8 miles southeast of Chester. Population of parish, 1901, 15,817; 1911, 20,571. Near by stands Hawarden Castle, long the residence of William Ewart Gladstone. The castle, built in 1752, stands near the ruins of an older one granted by William the Conqueror to his nephew, Hugh of Avranches, called by the Welsh "The Wolf." After many vicissitudes it became the property of Cromwell's Lord Chief Justice, Sergeant Glynne, from whom it descended to Mrs. Gladstone. St. Deniol's Library and Hostel, established by Gladstone in 1896, is housed in magnificent Gothic buildings, erected in 1902 as part of the national memorial to that statesman. Consult Morley and Friederichs, "In William Gladstone's Village," in *Strand Magazine*, vol. xvi (London, 1898).

HAWEIS, hâ'is, HUGH REGINALD (1838-1901). An English clergyman and author. He was born at Egham, Surrey; graduated at Trinity College, Cambridge, in 1859; served under Garibaldi at the siege of Capua in 1860; and, after several other curacies, in 1866 became curate of St. James's Church, Marylebone, London. Indefatigable in his efforts to educate the masses, he strongly advocated the opening of libraries, galleries, and museums on Sundays. He often lectured at the Royal Institution and was a Lowell Institute lecturer in Boston in 1885. He was the Anglican delegate to the Chicago Parliament of Religions in 1893 and for the next two years continued a successful lecture and preaching tour around the world. He was

for some time editor of *Cassell's Magazine*. His numerous published works include: *Music and Morals* (1871); *American Humorists* (1883); *Christ and Christianity* (5 vols., 1886-87); *The Broad Church* (1891); *Travel and Talk* (2 vols., 1897); *Old Violins* (1898).

HAWEIS, MARY ELIZA (JOY) (?-1898). An English author, artist, and philanthropist, daughter of the genre painter T. M. Joy, born in London. She married the Rev. H. R. Haweis, was a member of the Society of Authors and of the Society of Woman Journalists, vice president of the Maternity Society and of the Central National Society for Women's Suffrage, and superintendent of the Mercy Branch of the British Woman's Christian Temperance Union. She exhibited at the Royal Academy, the Dudley Gallery, and the British Institution, and was a successful illustrator. Among her publications are *Chaucer for Schools* (1900) and a novel, *A Flame of Fire* (1897).

HAWES, hāz, STEPHEN (?-1523). An English poet. He was born probably in Suffolk and was educated at Oxford. He traveled on the Continent and became a groom in the household of Henry VII. His rare minor poems are of interest chiefly to bibliophiles. But his *Passe-tyme of Pleasure, or the Historie of Graunde Amoure and la Bel Pucel* (printed by Wynkyn de Worde in 1509) occupies an important place in the history of English poetry. It is a long allegorical poem, written in seven-line stanzas, divided into 46 chapters. It describes the education and career of a perfect knight specifically, but in its secondary sense is an allegory of the life of man. Hawes is a Chaucerian, and Spenser possibly drew some slight aid from this dry allegorist in framing his *Faerie Queene*. Reprints of sixteenth-century editions of the *Passe-tyme of Pleasure* have been made by Southey in *English Poets* (London, 1831) and by Wright (Percy Society, ib., 1845).

HAWESVILLE, hāz'vil. A city and the county seat of Hancock Co., Ky., 84 miles west by south of Louisville, on the Ohio River, and on the Louisville, Henderson, and St. Louis Railroad (Map: Kentucky, D 4). It is in a coal-mining and lumbering district and manufactures tobacco, hubs, etc. Pop., 1900, 1041; 1910, 1002.

HAWFINCH (from *haw*, hedge + *finch*). A large European finch, or grosbeak (*Coccothraustes coccothraustes*), considerably larger than the chaffinch. The adult male has the crown and back chestnut brown, the neck and rump gray, the wings partly black, the larger wing coverts white. The hawfinch exists numerously over the whole Palearctic Province and is only partly migratory, but is a very shy bird, avoiding man, and not much is known of its habits. It frequents orchards and hedgerows, seeking for berries and fruit, and gets its name from its supposed partiality for hawthorn berries. It nests in hedgerows and in forest trees.

HAWICK, hā'ik. A manufacturing town and ancient burgh or barony in Roxburghshire, Scotland, at the junction of the Teviot and Slitrig, 50 miles southeast of Edinburgh (Map: Scotland, F 4). It has important hosiery and tweed mills, dye works, and tanneries. Its grain and stock market is one of the most important in the south of Scotland. Its antiquities have almost disappeared; the most important is the Moathill, an earthen work 30 feet high and 312 in circumference. Its oldest church, dating from 1214, was rebuilt in 1763. It has fine modern

residences, a handsome town hall, a splendid water supply, and a complete system of drainage. Its municipal charter was granted in 1537. Pop., 1901, 17,303; 1911, 16,877.

HAWK (AS. *heafoc*, *hafuc*, Icel. *hawk*, OHG. *habuh*, *habih*, Ger. *Habicht*, hawk, from AS. *hebban*, Goth. *haffjan*, OHG. *heffan*, Ger. *heben*, Eng. *heave*; connected with Lat. *capere*, to seize, Alb. *kap*, I seize). A term popularly meaning any bird of prey not an owl nor vulture. In a more restricted sense the word designates a section of the family, the Accipitrinae, reckoned by falconers among the ignoble birds of prey. They have wings so short as not to extend to the extremity of the tail, and the bill short and curving from the base. In many of their characters and habits, however, they make a very near approach to the true falcons. In this sense the term would exclude eagles, buzzards, harriers, kites, and the like. In fact, however, the scientific use is hardly more exact than the popular, and descriptions of the various birds so called will be found under FALCON, and under the names of groups or species, as BUZZARD; HEN HAWK; MARSH HAWK; PIGEON HAWK; and so on. (See also Plate of EAGLES AND HAWKS.) It should also be noted, however, that in some instances the name is entirely misapplied, ornithologically speaking, to birds whose shape or actions suggest those of a falcon. Examples of this are "man-of-war hawk" (the frigate bird) and "nighthawk" (q.v.), or "mosquito hawk" (a nightjar).

HAWK-BILLED PARROT. A large and remarkable parrot (*Derotypus accipitrinus*) of the Amazon and Orinoco valleys, related to the Amazon group (*Chrysotis*), and especially characterized by an erectile collar or ruff around the back of the neck. This ruff, the breast, and abdomen are dark red, each feather with a blue edge; the head is brown; the shoulder and inside of both wings and tail are black, while the plumage of the back wings and tail above are green. It frequents palm trees, utters a cry of piercing shrillness, and erects its ruff when angry or excited with a most threatening effect. It is said to become an admirable pet, as it is easily tamed, is very hardy, agile, and graceful in its movements, and is nearly as good a talker as the gray parrot. Consult Greene, *Parrots in Captivity* (London, 1884).

HAWKE, EDWARD, BARON (1705-81). An English admiral. He was born in London. He entered the navy in 1720 and served on the North American and West Indian stations until 1725, when he returned to England and passed his examinations. After serving several years on various foreign stations, he came into prominence in the naval engagement at Toulon in 1744, when he broke from the line of battle in order to engage the Spanish ship *Poder* and succeeded in compelling her to strike her colors. In 1747 he was promoted rear admiral of the white. In October of the same year he captured six out of a squadron of nine French men-of-war convoying a fleet of merchant vessels bound for the West Indies, and was created Knight Commander of the Bath. In December of the same year he was chosen member of Parliament for Bristol. In May, 1748, he became vice admiral of the blue. In 1756 he succeeded Admiral Byng as commander of the fleet in the Mediterranean. In 1759 he took charge of a squadron sent to cruise off Brest and to intercept a French fleet preparing for an invasion of England. On

the morning of November 20 he sighted the French fleet under Admiral Conflans, off Belle-Isle, and notwithstanding that the French, trusting to their knowledge of the rocks and shallows, retired towards the shore, he engaged them with such impetuosity that more than half of their vessels were either disabled, captured, or driven on shore. For this victory, gained with the loss of only two vessels, Hawke received the thanks of the House of Commons and a pension of £2000 per annum. In 1765 he was appointed vice admiral of Great Britain, and from 1766 to 1771 he was First Lord of the Admiralty. In 1776 he was raised to the peerage, with the title of Baron Hawke of Towton. He died at Sunbury, Oct. 16, 1781. Consult: Burrows, *Life of Edward Lord Hawke* (London, 1883); Fremantle's "Hawke," in *From Howard to Nelson*, edited by Laughton (London, 1899); Mahan, *Types of Naval Officers* (Boston, 1901).

HAWK EAGLE. A convenient term for a group of large birds of prey of the Old World which combine characteristics of both eagles and hawks and in most cases are crested. The best known of these is Bonelli's hawk eagle (*Nisaetus fasciatus*), which ranges from Spain (where it is a common resident on the rock of Gibraltar) to the Far East, where it is one of the largest and most prominent birds of prey. In India it is numerous and conspicuous, both in the high mountains and in the lowland jungles, and is one of the large hawks called peacock killers. The booted eagle (*Nisaetus pennatus*) of the Mediterranean region, noted for its shrill scream, and the beautiful great crested eagle of Africa (*Spizaetus bellicosus*) are other representatives of the group, in which some authors include the crested eagle hawks of tropical America.

HAWKE BAY. An inlet on the east coast of North Island, New Zealand, which gives its name to a provincial district, and a county between Auckland and Wellington, surrounded by one of the two valuable tracts of the island (Map: New Zealand, North I., C 6). The bay was named after Sir Edward Hawke, First Lord of the British Admiralty, when Captain Cook on Oct. 8, 1769, entered it for the first time. Napier, the chief city and port of the district, is on the bay. European settlement dates from 1848.

HAWKER. See PEDDLER.

HAWKER, ROBERT STEPHEN (1803-75). A Cornish poet and antiquary, born at Stoke Damerel, Devonshire. He was educated at Pembroke College, Oxford (where he won the Newdigate prize in 1827 by a poem on Pompeii), was ordained in 1831, and went as vicar to Morwenstow, Cornwall, in 1834. Afterward the neighboring parish of Wellcombe was added to the living. Hawker did much for the people in his poor parish during his 40 years as priest among them, especially for the seafaring men. Towards the end of his life he became a Roman Catholic and in his last hours was received into that church. Mortimer Collins pictures Hawker as Canon Tremaine in his novel *Sweet and Twenty*. His works include: *Records of the Western Shore* (1832; 2d series, 1836); *Ecclesia* (1840-41); *Reeds Shaken by the Wind* (1843); *Second Cluster* (1844); *Echoes from Old Cornwall* (1846-47); *The Quest of the Sangraal* (1864); *Cornish Ballads and Other Poems* (1869 and 1884). His collected poetical works appeared in 1879, with a notice by J. C. Godwin. He also wrote *Footprints of Former Men in Far*

Cornwall (1870). His most celebrated poem, *And Shall Trelawny Die*, first published anonymously, was believed, even by such men as Scott and Dickens, to be an old ballad. Consult: Lee, *Memorials of the Late Rev. R. S. Hawker* (London, 1876); Gould, *The Vicar of Morwenstow* (ib., 1876); C. E. Byles, *Life and Letters of R. S. Hawker* (New York, 1905). There is an excellent critical study of Hawker in P. E. More's *Shelburne Essays* (4th series, New York, 1906).

HAWKESBURY. A river of New South Wales, Australia. It rises in the Blue Mountains and flows northeast parallel with the coast until it passes Windsor, where it turns to the southeast and enters the Pacific at Broken Bay, 20 miles north of Sydney (Map: New South Wales, F 3). Its length is about 330 miles, and it is navigable for ships of 100 tons to Windsor, about 50 miles from its mouth. It is crossed by a steel railway bridge, 2900 feet long. The Hawkesbury is remarkable for its inundations; in 1844 the waters rose 20 feet in a few hours, while earlier in its history the inundations disheartened the pioneers, who several times lost their homesteads and produce.

HAWKESBURY. A town in Prescott Co., Ontario, Canada, on the Grand Trunk and the Canadian Northern railroads, and on the Ottawa River, 55 miles west by north of Montreal (Map: Ontario, K 2). It has large lumber, pulp, and paper mills, and excellent communication by both rail and water. The town owns its water and sewerage systems. Pop., 1901, 4150; 1911, 4400.

HAWKESWORTH, JOHN (c.1715-73). An English writer. Apprenticed to an attorney, his first steps in literature were in the footprints of Samuel Johnson, compiling parliamentary debates for the *Gentleman's Magazine* (1744), in which some of his poems were afterward published. Most of his essays appeared in the *Adventurer*, successor of the *Rambler*, which was very popular during the two years of its existence (1752-54), and of which Hawkesworth was editor and joint founder. Besides adapting old and writing such new plays as *Edgar and Emmeline* (1761), he wrote the words for an oratorio, *Zimri* (1760); an Oriental tale, *Almorán and Hamet* (2 vols., 1762); translated Fénelon's *Télémaque* (1768); prepared an edition of the *Works of Jonathan Swift* (6 vols., 1755), and, for the government, an unsatisfactory account (1733) of the voyages of Captain Cook and others in the southern seas. He was for some time intimate with Dr. Johnson, whose style he could imitate to perfection; and his portrait was painted four times by Sir Joshua Reynolds.

HAWKEYE. One of the names by which Natty Bumppo is called in Cooper's Leatherstocking novels.

HAWKEYE STATE. Iowa. See STATES, POPULAR NAMES OF.

HAWKING. See under FALCONRY.

HAWKINS, ANTHONY HOPE (1803-). An English novelist, known widely as "Anthony Hope." He was born in London and was educated at Marlborough and at Oxford, where he took honors in classics. He studied law, and was admitted to the bar in 1837, but gave up practice in 1894. In 1897 he visited the United States. His first book was *A Man of Mark* (1890), followed in quick succession by *Father Stafford* (1891); *Mr. Witt's Widow* (1892); *Sport Royal*, a collection of short stories (1893);

and *The Prisoner of Zenda* (1894; 60th ed., 1914). This last book, the scene of which is laid in an imaginary principality of South Germany, is a happy combination of romanticism and modernity. Its immense success induced other authors to write uncounted numbers of novels of the same type, but not of the same quality. To the same year belong the delightful and brilliant *Dolly Dialogues*, which have been many times reprinted. Other of his novels are: *The Chronicles of Count Antonio* (1895); *Comedies of Courtship and The Heart of Princess Osra* (both 1896); *Phroso* (1897); *Simon Dale and Rupert of Hentzau* (both 1898); *The King's Mirror* (1899); *Quisante* (1900); *The Intrusions of Peggy* (1902); *The Indiscretion of the Duchess* (1904); *Double Harness* (1904); *Sophy of Kravonia* (1906); *The Great Miss Dover* (1908); *Mrs. Mawon Protests* (1911).

HAWKINS, BENJAMIN WATERHOUSE (1807-89). An English animal sculptor and author, born in London. He lived at Knowsley, the seat of the Earl of Derby, for five years, where he studied animal sculpture. He was assistant superintendent of the International Exhibition of 1851, and in 1852 the Crystal Palace Company employed him to make restorations of extinct animals, in which he was an expert. In 1868 he lectured in New York City and other cities of the United States, where he afterward resided. He was employed by the Central Park commissioners of New York City in restoring the forms of extinct creatures, but later administrations rejected his work, much of which was destroyed. He wrote: *Elements of Form* (1842); *Comparative View of the Human and Animal Frame* (1860); *Atlas of Comparative Osteology* (1865), with Huxley; *Artistic Anatomy of Cattle and Sheep* (1867); *Artistic Anatomy of the Dog and Deer* (1876).

HAWKINS, DEXTER ARNOLD (1825-86). An American lawyer, born in Camden, Me. He graduated at Bowdoin College in 1848, after which he divided his time between teaching, traveling, and studying law until 1854, when he began to practice in New York City. He lectured and wrote on various subjects, but especially on education, which engaged his chief interest. He was largely instrumental in securing the establishment of the National Bureau of Education, and his pamphlets did much to open the eyes of the people to abuses practiced under the educational laws of New York. His publications include: *Sectarian Appropriations of Public Money and Property* (1869); *Report on Compulsory Education* (1874); *The Duty of the State to Protect the Free Common Schools by Organic Law* (1871); *The Roman Catholic Church in New York City, and the Public Land and Public Money* (1880); *The Redemption of the Trade Dollar* (1886).

HAWKINS, HAMILTON SMITH (1834-1910). An American soldier, born in South Carolina. He graduated at the United States Military Academy in 1855 and in 1861 entered the army. In 1883 he attained the rank of major and in 1889 was promoted to be lieutenant colonel. In 1888 he became commandant at the United States Military Academy, in 1894 colonel, and in the same year commandant of the Fort Leavenworth school. During the Spanish-American War he commanded the division which took San Juan Hill in the second day's battle at Santiago. In 1898 he was promoted to be brigadier general and retired.

HAWKINS, or HAWKYN, SIR JOHN (1532-95). An English naval commander, the son of William Hawkins, a merchant and sea captain of Plymouth, who had made several voyages to America. He was born at Plymouth. He followed the sea from an early age, and by 1561 had made several voyages as far as the Canaries. In 1562, with influential backing, he sailed from England with three ships, secured a cargo of 300 negroes on the coast of Sierra Leone, and then crossed the Atlantic to the West Indies, where he forced the Spaniards to take slaves in exchange for hides, spices, sugar, and ginger. He himself returned to England, but sent two shiploads of merchandise to Spain, where they were seized and the cargoes confiscated. This loss did not deter him from fitting out another expedition on a larger scale in 1564, in which the Earl of Pembroke and Robert Dudley, later Earl of Leicester, were among his partners, and in which Queen Elizabeth herself was interested to the extent of lending him her ship *Jesus*. With four vessels he sailed to the African coast, where his cargoes of negroes were obtained only after hard fighting. After a show of arms at Burburata, Venezuela, and at Rio de la Hacha, a "satisfactory trade was opened" and his negroes at length disposed of. Sailing northward, Hawkins relieved the French colony of Laudonnière, on St. John's River, Fla., leaving them provisions and a small ship, and thence sailed homeward. The voyage was exceedingly profitable for all the partners, and Hawkins was granted a coat of arms for his skill. The protests of the Spanish were so great at this threat to their trade monopoly that it was not until 1567 that the Queen would consent to let Hawkins undertake another voyage. Then, indeed, she showed her favor so far as again to lend him the *Jesus*, quite likely becoming thereby a partner in the enterprise. On October 2 the little fleet of six ships, one of which, the *Judith*, was commanded by Francis Drake (q.v.), a kinsman of Hawkins, set sail from Plymouth. Following the course of his previous voyages, Hawkins sailed first to Sierra Leone, where about 500 negroes were obtained, and where some Portuguese merchantmen were plundered and more than 70,000 pieces of gold secured from them. Again force had to be used before the Spanish in the West Indies would trade with them. A large part of his cargo was disposed of at Rio de la Hacha, Cartagena, and other ports, and they had turned their prows towards home, when, according to Hawkins's account, a storm drove them into the harbor of San Juan de Lua (Vera Cruz) on the coast of Mexico. There, on September 17, a day after they had entered the port, they were beset by a Spanish fleet of 13 ships. After three days' negotiation a peaceful agreement was arrived at, and the Spanish fleet entered the harbor. The truce was short-lived, however, and on the 24th a conflict was precipitated. Hawkins defended his ships stubbornly, but the odds against him were overwhelming. The *Jesus* was disabled, and Hawkins transferred himself to the *Mission*, one of his smaller ships, in which he finally escaped to sea. The *Judith*, with Drake in command, was the only other English ship that got away from the harbor. After this disastrous voyage Hawkins remained in England for some years, was elected to Parliament in 1572, and in 1573 was made Treasurer and Comptroller of the Royal Navy. His practical

experience as a navigator enabled him to bring about a number of important improvements in the rigging and construction of the ships of the navy; and in spite of charges of dishonesty in contract work the navy was made more efficient than it had ever been before. In 1588 he took part as a rear admiral in the defeat of the Spanish Armada, personally commanding the *Victory*, and winning knighthood for his bravery in action. In 1595 he accompanied Sir Francis Drake in an unsuccessful expedition to the West Indies in search of Spanish treasure and died at sea off Porto Rico the 12th of November. He was one of the founders, with Drake, of the fund for disabled seamen known as "the chest at Chatham," and in 1592 built the Sir John Hawkins Hospital at Chatham. Consult: Campbell, *Lives of the Admirals* (London, 1812-17); Southey, *Lives of the British Admirals* (ib., 1833-40); *The Hawkins's Voyages*, Hakluyt Society Publications (ib., 1877); Winsor, *Narrative and Critical History of America*, vol. iii (Boston, 1884); Adams, *English Heroes in the Reign of Elizabeth* (Edinburgh, 1902); G. A. R. Callender, *Sea Kings of Britain* (3 vols., New York, 1907); Walling, *A Sea-Dog of Devon* (ib., 1907).

HAWKINS, SIR JOHN (1719-89). An English writer on music. He was born in London, became a lawyer, and devoted his leisure to his favorite study of music. His marriage to a wealthy woman in 1753 enabled him to indulge his passion for acquiring rare works of music, and he bought the collection formed by Dr. Pepusch, which he subsequently presented (1779) to the British Museum. On such materials he founded his celebrated work on the *General History of the Science and Practice of Music* (1776; republished 1853 and 1875), which, although badly written, contains much of historical value. In fact, Burney (q.v.), whose history is equally famous, did not scruple to avail himself of the material first collected by Hawkins.

HAWKINS, or HAWKYNs, SIR RICHARD (c.1562-1622). An English naval hero, only son of the more famous Sir John Hawkins (q.v.). He went to the West Indies for the first time in 1582 with an expedition commanded by his uncle, William Hawkins. In the fight against the Invincible Armada (1588) he commanded the Queen's ship *Swallow*; and in 1593 he set out with three vessels on a voyage around the world, for purposes of preying on the Spaniards and for exploration and discovery. An account of the early part of this voyage was written by himself many years afterward and is therefore not to be too greatly relied upon. He touched at various places on the east coast of South America, passed through the Straits of Magellan, and then sailed northward to Valparaiso, which he captured and plundered; but on June 18, 1594, almost exactly a year after he had left England, he was attacked in the Bay of San Mateo by two Spanish ships under the command of Don Beltran de Castro, a brother-in-law of the Viceroy. The English numbered only about 75 men at this time, while the Spaniards are said to have been at least 10 times as numerous. After three days of fighting Hawkins surrendered on condition that the prisoners' lives should be spared and that they should be sent back to England as soon as possible. In spite of this he was kept in Lima until 1597 and then sent to Spain, where he was imprisoned until 1602. When released, he returned to Eng-

land, where he was knighted, elected a member of Parliament, and made vice admiral of Devon. In 1620-21 he was vice admiral under Sir Robert Mansell of the unsuccessful expedition against the pirates of Algiers. Consult Markham, *The Hawkins's Voyages* (London, 1878).

HAWKINSVILLE, hă'kīnz-vīl. A city and the county seat of Pulaski Co., Ga., 49 miles by rail south of Macon, on the Ocmulgee River, at the head of navigation, and on the Southern, the Hawkinsville and Florida Southern, the Hawkinsville and Western, and the Wrightsville and Tennille railroads (Map: Georgia, C 3). It is the centre of a region which ships agricultural produce, lumber, naval stores, and cotton, and has a cotton mill, cotton gins and compresses, cottonseed-oil mills, carriage and wagon shops, a hardwood mill, fertilizer factories, a brickyard, etc. The city owns its water works and electric-light plant. Pop., 1900, 1013; 1910, 3420.

HAWK MOTH. A moth of the family Sphingidae. These moths have very stout bodies and long, narrow wings. The sucking tube is usually very long and when not in use is coiled spirally under the head. Most of the hawk moths are large, strong on the wing, and fly at dusk. The larger species are not infrequently called humming-bird moths, because while sipping nectar they have the same poised attitude of the body as the humming birds, maintained by a rapid wing movement. They are all beautiful moths, but in quiet hues—olive, gray, or brown being the prevailing colors, with a bit of yellow or pink in some species. The larvæ have given the name "sphinx" to the type genus of the family, because of the stiff, erect poise assumed by them when disturbed. Near the posterior end of the body a dorsal horn, tubercle, or knob is usually present. About 100 North American species have been described. The most common species are the tomato worm and the tobacco or "horn" worm (qq.v.). Consult Beutenmüller, "Descriptive Catalogue of the Sphingidae Found within Fifty Miles of New York City," in *Bulletin of the American Museum of Natural History*, vol. vii (New York, 1898), and Rothschild and Jordan, *A Revision of the Sphingidae* (Tring, Eng., 1903).

HAWK OWL. 1. A large and remarkable owl (*Surnia ulula*) of the subarctic region of both continents, occasionally seen in central Europe and the northern United States in mid-winter. It is about 16 inches long and mottled brown in color, the American specimens being darker, as a rule, than those of the Old World. There are no ear tufts, the top of the head seems flat, and the face very hawklike; it is also hawklike in its manner of flight and is often seen abroad in full daylight. It feeds upon birds and small mammals and always appears in large numbers when the lemmings become plentiful and take to migrating. It usually nests in the hollow of a broken tree top, and defends its five to eight white eggs or young with great courage. In Alaska it is not uncommon and destroys many ptarmigan. See Plate of OWLS.

2. Any of the owls of the genus *Ninox*, or *Hieracoglauz*, inhabiting southeastern Asia and Australia and also Madagascar, often distinguished as "Oriental hawk owls." Their small heads, long tails, and hard plumage give them a very falconine appearance, and the Australian species (*Ninox*, or *Hieracoglauz strenua*) reaches a length of 24 inches.

HAWKS, FRANCIS LISTER (1789-1866). An

American clergyman, born at Newbern, N. C. He graduated at the University of North Carolina (Chapel Hill) in 1815, studied law under Judge William Gaston, of Newbern, was admitted to the bar, and was elected from Newbern to the State Legislature. He studied theology under the direction of the Rev. W. M. Green (later Bishop of Mississippi); was ordained to the diaconate in 1827; in 1830 was elected professor of divinity in Washington College (now Trinity, Hartford, Conn.); and in 1831 was instituted rector of St. Stephen's Church, New York City; later in 1831 he was elected to the rectorship of St. Thomas's parish, New York, in which office he continued until 1843. He was appointed professor of ecclesiastical history in the General Theological Seminary in 1833 and in 1835 and in 1836 visited England for the purpose of making copies of documents pertaining to the early history of the Protestant Episcopal church in America. From the 18 large folio volumes of manuscripts he prepared two works—on Virginia (1836) and Maryland (1839) respectively. Because of criticism of these, he then withdrew from the undertaking. A school, St. Thomas Hall, established by him at Flushing, L. I., in 1839, became involved in financial embarrassments and failed in 1843. Upon the establishment of the University of Louisiana he was elected its first president. In 1849 he returned to New York as rector of the church of the Mediator, later merged with Calvary parish, the rectorship of which he assumed. In 1862, owing to difference of opinion between his parishioners and himself regarding the Civil War, he resigned, and until 1865 he was rector of Christ Church, Baltimore, Md. He became rector of the newly organized parish of the Holy Saviour in New York in 1865. He was a scholar of high attainment, particularly in ecclesiastical history, and an eloquent preacher. From 1855 to 1861 he served as president of the American Geographical Society. The long list of works written or edited by him further includes: *Commentary on the Constitutions and Canons of the Protestant Episcopal Church in the United States* (1841); *Egypt and its Monuments* (1849); *A History of North Carolina* (1857); *Narrative of Commodore Perry's Expedition, Compiled from Perry's Original Notes and Journal* (1856); and (with W. S. Perry) *Documentary History of the Protestant Episcopal Church in the United States of America* (vols. i and ii, 1863-64). Consult the sketch by Richardson (reprinted from the *American Quarterly Church Review* for April, 1867) in a memorial volume (New York, 1868); also the commemorative discourse by Morgan (ib., 1867).

HAWKS'BEE, FRANCIS. The name of two English physicists. See HAWKSБEE.

HAWKSBILL TURTLE, or CARET. A large carnivorous sea turtle (*Chelonia*, or *Eretmochelys imbricata*), so named on account of the shape of its bill, which is a formidable weapon. Its flesh is not good food, but its eggs are sweet. The species is valuable for the plates of its shell, which overlap each other, and furnish the tortoise shell of commerce. This turtle is common in tropical seas, especially the West Indies, the South Sea Islands, and in the Indian Ocean.

HAWKSHAW, hăk'shă, SIR JOHN (1811-91). An English civil engineer, born in Yorkshire, England. After a common-school educa-

tion in Leeds, he turned to the practical study of engineering, went to Ireland in 1831 to serve under Alexander Nimmo, and in 1832 engaged in mining engineering in Venezuela. He returned in 1834, was connected with various English and German railroads, canals, and docks, settling in London in 1850 as a consulting engineer. His subsequent professional work was concerned with many branches of engineering, in all of which he displayed intimate knowledge and sound judgment; and he was consulted regarding almost all the great engineering projects of his time in Europe. He constructed the Charing Cross, East London, and Cannon Street railroads; a tunnel under the Severn River; the Clifton Suspension Bridge, the Londonderry Bridge in Ireland, and the Nerbudda Bridge in India; and the Amsterdam Ship Canal. He was often the government commissioner in investigating sanitary and military matters and in 1863 was the engineer summoned to report finally upon the plans and site for the Suez Canal, then in course of construction and subject to much hostile criticism. He was at one time engineer of the original Channel Tunnel Company and believed in its feasibility as an engineering project. In 1873 he was knighted. He became a member of the Royal Society in 1855, was president of the Institute of Civil Engineers from 1862 to 1864, was made president of the British Association in 1875, and was an honorary member of the American Society of Civil Engineers. His published works include *Reminiscences of South America* (1838) and a large number of reports dealing with his varied professional labors.

HAWKS'LEY, THOMAS (1807-93). An English civil engineer, born at Arnold, near Nottingham. He was educated at the Nottingham grammar school and in 1822 began an apprenticeship to an architect and surveyor named Staveland, who later took him into partnership. His first important engineering work was the development of an increased water supply for Nottingham in 1830. In 1852 he removed to London, where his fame and reputation grew rapidly, until he was recognized as the greatest authority on water-works engineering in England and one of the foremost engineers in that branch in the nineteenth century. At one time or another he was engaged in some capacity, either as a consulting or constructing engineer, by almost every large city in the United Kingdom. His greatest achievements were in connection with the Sheffield and Leicester water works and the planning and construction of the Vyrnwy Dam of the Liverpool water works. On the latter work he was for some time joint engineer with George F. Deacon. He resigned before the dam was completed, alleging that its stability was in question. The allegation was not supported by a subsequent investigation, and the dam has stood safely for several decades. He was president of the Institute of Civil Engineers for two years (1871-73), president of the Institution of Mechanical Engineers in 1876-77, and was elected a fellow of the Royal Society in 1878.

HAWKSMOOR, NICHOLAS (1661-1736). An English architect, born in Nottinghamshire. At 18 years of age he entered the service of Sir Christopher Wren, under whose supervision he built several important structures. He became deputy surveyor at Chelsea Hospital (1682-90), clerk of the works of Greenwich Hospital in

1698, and deputy surveyor in 1705. He afterward was associated on more equal terms with his former master and with Sir John Vanbrugh. He assisted Wren in building St. Paul's Cathedral from 1675 to 1710, was associated with Sir John Vanbrugh at Castle Howard, Yorkshire, and also at Blenheim Palace, Oxfordshire. At Oxford he designed the library and the south quadrangle of Queen's College and also the north quadrangle (with the exception of the library) of All Souls' College. At the close of Queen Anne's reign Hawksmoor was appointed one of the surveyors for the building of 50 new churches and designed six of these, the best being that of St. Mary Woolnoth, with a very fine interior, and St. George's, Bloomsbury, noted for its portico. After the death of Wren, in 1723, Hawksmoor was appointed surveyor-general of Westminster Abbey and completed the two western towers after his former master's designs. He also drew designs for monuments and bridges. He was not remarkable for creative genius, his chief excellence being a mastery of details and construction; but, on the other hand, some of the buildings attributed to his more eminent associates are believed to have been designed by him.

HAWKWEED' (*Hieracium*). A genus of plants of the family Compositæ. The species are annual or perennial, with leafless scapes or leafy stems, one-flowered, or many-flowered; the leaves, stems, and involucre in many species are hairy. The hawkweeds are very numerous, natives of the temperate and colder regions of the Northern Hemisphere, particularly abundant



ORANGE HAWKWEED.

in Europe. The flowers are generally yellow. The orange hawkweed (*Hieracium aurantiacum*), a perennial, 1 to 2 feet high, is a native of the south of Europe, often cultivated in gardens for its rich orange flowers. It has been introduced into Canada and the New England States, where it has become one of the most troublesome weeds in grasslands. Experiments conducted at the Vermont Experiment Station

showed that it could be eradicated by salt sown at the rate of 300 pounds per acre. Every plant was killed, and the grass, a species of *Festuca*, was improved by the treatment. Plowing under and devoting the land to hoed crops will destroy it. There are a dozen or more species, native or introduced, in the eastern United States. *Hieracium venosum*, rattlesnake weed, or Robin's plantain, is a common species from Maine to Georgia and westward, occurring in dry woods and sandy places.

HAWKWOOD, SIR JOHN DE (?-1394). An English soldier of fortune. He is reported to have fought with the Black Prince at Crécy and Poitiers and to have been knighted by Edward III; but by 1360 he was at the head of a body of freebooters, plundering Gascony and the northern parts of Italy. His thousand lancers, each with knight and page, came to be known as the White Company, and, joined to double their number of foot soldiers, armed with stout bows of yew, they spread terror throughout southern Europe, devastating villages, holding great noblemen for ransom, and exacting heavy toll from the clergy. After serving under the Marquis of Montferrat, the White Company went into the pay of the Pisan Republic, which was then engaged in a Florentine war. From that time onward Hawkwood took a prominent part in the strife between the different Italian republics, fighting generally upon the side of Florence, by whom he was paid a pension. He fought both for and against Pope Gregory XI. He was endowed with an equal talent for strategy and for organization. He spent the last years of his life among the Florentines, who buried him with great pomp. Consult *Sir John Hawkwood*, translated from the Italian of Temple-Leader and Marcotti by Leader Scott (Florence, 1889).

HAWKYNs. See **HAWKINS**.

HAWLEY, CHARLES B. (1858-1916). An American musician, born in Brookfield, Mass. He studied composition under Dudley Buck, Joseph Mosenthal, and C. B. Rutenber, and voice culture with G. J. Webb, P. A. Rivarde, and Gustav Federlein. He became bass soloist in the Calvary Episcopal Church, New York, assistant organist of St. Thomas's, and in 1883 director of the choir at the Broadway Tabernacle. His compositions include many excellent and popular songs and considerable Church music.

HAWLEY, EDWIN (1850-1912). An American railroad official, born at Chatham, N. Y. Early in life he sold produce, was a newsboy in New York City, and was successful as an owner of tugboats. Employed by Collis P. Huntington on the Southern Pacific, he quickly rose to a position of importance in the railroad world. As a buyer and seller of railroads and railroad stocks, he in a measure occupied the place left vacant by the death of E. H. Harriman. He purchased the Minneapolis and St. Louis, the Iowa Central, the Colorado and Southern (which he sold to James J. Hill), the Chesapeake and Ohio, the Chicago, Cincinnati, and Louisville, and the Hocking Valley railroads; and he gained a controlling interest in the Chicago and Alton and in the Missouri, Kansas, and Texas. He left a fortune of more than \$25,000,000.

HAWLEY, GIDEON (1727-1807). An American missionary among the Indians. He was born in a part of Stratford that is now Bridgeport, Conn., graduated at Yale in 1749, and under

the supervision of Jonathan Edwards began work among the Indians at Stockbridge in 1752. Two years later he undertook a mission to the Iroquois on the Susquehanna River, but he was driven out in 1756 by the French and Indian War. After the war he attempted to return, but was deterred by the danger. The latter part of his life was passed in missionary service among the Indian tribes at Mashpee, Mass.

HAWLEY, JOSEPH (1723-88). An American statesman of the Revolutionary era. He was born in Northampton, Mass., graduated at Yale in 1742, and studied for the ministry, but finally became a lawyer. He was a delegate to the Massachusetts Congress (1774-75) and a special pleader for popular rights.

HAWLEY, JOSEPH ROSWELL (1826-1905). An American politician and legislator, born in Stewartsville, N. C., Oct. 31, 1826. His father, a Connecticut Baptist clergyman, returned to his native State in 1837, and there the son was brought up and imbued with antislavery ideas. He was educated at Hamilton College (New York), where he graduated in 1847, afterward studying law, and beginning practice at Hartford, Conn., in 1849. He immediately entered politics as a Free Soil Democrat, became chairman of the party's State Committee, and in 1852 editor of its principal State organ, the *Charter Oak*. The movement which resulted in the founding of the Republican party received his support, and the first meeting for its organization in Connecticut was held in his office. In the next year he abandoned the law and became editor of the *Hartford Evening Press*, the newly established Republican paper. Twenty-four hours after President Lincoln's first call for troops, Hawley recruited the first company of volunteers raised in the State, which became Company A of the First Connecticut Regiment, with Hawley as captain. He participated in the first battle of Bull Run, after which he became lieutenant colonel of the Seventh Connecticut Volunteers, with it took part in the Port Royal expedition, and was present at the siege and capture of Fort Pulaski. In January, 1863, as colonel, he took his regiment to Florida and was present at the siege of Charleston and capture of Fort Wagner. In February, 1864, he commanded a brigade in the battle of Olustee, Fla., and later in the same year saw active campaigning in Virginia, being present at the siege of Petersburg. In September, 1864, he was promoted brigadier general of volunteers. In 1865 he served as General Terry's chief of staff, was with Sherman in the Carolina campaign, and on September 25 was brevetted major general. In April, 1866, he was elected Governor of Connecticut. In 1867 he was defeated for reelection and turned his attention to journalism, purchasing the *Hartford Courant*, with which he united the *Press*, and, for the rest of his life produced one of the most influential Republican newspapers in the country. He became prominent as a Republican campaign speaker, was chairman of the Republican National Convention in 1868, and chairman of the Committee on Resolutions at the Convention of 1876. In November, 1872, he was elected to fill a vacancy in Congress and was reelected for a full term to the Forty-third Congress, serving from 1873 to 1875, and taking part in the fight for sound money and the resumption of specie payments. He was defeated in 1874 and 1876, but was again elected in 1878, serving from 1879 to 1881,

and at the end of the term was elected to the United States Senate. He was president of the United States Centennial Committee from March, 1873, to the completion of the work of the Centennial Exposition. In 1884 he was a candidate for the presidential nomination before the Republican National Convention. He was reelected to the Senate in 1887, 1893, and 1899, served as chairman of the Senate committees on the Civil Service and on Military Affairs, was a persistent advocate of strong coast defenses, vigorously opposed the Chinese Exclusion Bill, and favored an international copyright. On March 3, 1905, at the close of his fourth term as Senator and 14 days before his death, he was placed on the retired list of the army with rank of brigadier general.

HAWORTH, hg'wërth, ADRIAN HARDY (1767-1833). An English entomologist and botanist, born at Hull. He studied law, but never practiced it. His place of abode was alternately Cottingham and Little Chelsea, and he was founder in chief of the Entomological Society of London, afterward a section of the Linnæan Society, of which he was also a member. The Botanical Garden at Hull was begun under his direction, and he made collections of specimens, and wrote works upon botany and entomology, including: *Observations on the Genus Mesembryanthemum* (1794); *Prodromus Lepidopterorum Britannicorum* (1802), enumerating 793 species; the sixth volume of the *Botanist's Repository* (1803); and *Synopsis Plantarum Succulentarum* (1812), which is planned on the Linnæan system, and gives in Latin the description, habitat, date of introduction, and month of flowering of each species. A supplement to this work was issued in 1819.

HAWORTH, ERASMUS (1855-). An American geologist, born near Indianola, Warren Co., Iowa. He graduated from the University of Kansas in 1881 and from Johns Hopkins University (Ph.D.) in 1888 and taught in various colleges, becoming professor of geology and mineralogy at the University of Kansas in 1892. He organized the Kansas Geological Survey in 1894 and became State geologist, joined the United States Geological Survey, and did much work for railroads and private corporations. His publications comprise vols. i-iii and viii and Bulletin I on the well waters of Kansas (1895-1904) and parts of vols. v and ix in the *Reports of the Kansas State Geological Survey*; the annual reports on the mineral statistics of Kansas (1897-1904); and bulletins of the Missouri and the United States geological surveys.

HAWORTH, JOSEPH (1855-1903). An American actor, born at Providence, R. I. At the age of 18 he became a member of a stock company in Cleveland, Ohio, where he was brought up, having already once appeared upon the stage there a year or two before with Charlotte Crampton in *Richard III*. During the season of 1882-83 he toured with John McCullough. Afterward, for several years, he himself traveled as a star in *The Bells*, *The Leavenworth Case*, *Hamlet*, and other Shakespearean plays. In 1896-98 he supported Madame Modjeska, playing an exceedingly effective Macbeth to her Lady Macbeth. His subsequent rôles included those of John Storm in *The Christian*, Rafael in *The Ghetto*, Vinicius in Stanislaus Stange's version of *Quo Vadis*, and Cassius in Mr. Richard Mansfield's production of *Julius Cæsar*. Consult

Strang, *Famous Actors of the Day in America* (Boston, 1900), and Clapp and Edgett, *Players of the Present* (New York, 1899).

HAW RIVER. A name sometimes applied to the upper course of Cape Fear River (q.v.) in North Carolina, above its confluence with Deep River, the two being regarded as the head streams of the Cape Fear (Map: North Carolina, C 1).

HAWSE, *haz* or *has* (older form *halse*, from Icel. *hals*, neck, fore part of a ship, AS. *heals*, Goth., OHG. *hals*, Ger. *Hals*, neck; ultimately connected with Lat. *collum*, neck). 1. The part of a ship in which the *hawse pipes*, or heavy castings forming the lining for the *hawse hole* through which the anchor cable passes, are placed. 2. The direction of the cable by which the ship is riding. 3. The cables of a ship when moored. A vessel is *athwart the hawse* of another when she or her chain is ahead of the latter and across her stem or chain, or nearly so. When a ship is moored, she is said to have a clear hawse when the chains lead from the hawse pipes to the anchors without touching each other. The hawse is *open* when the chains lead away from the bows to their respective anchors and the ship rides to both of them. If a ship lying in this position swings through 180°, she will have a *cross* in her hawse, the chain leading from its pipe across the stem to the anchor which is on the other side; another swing of 180° in the same direction gives an *elbow* in the hawse; the next, a *round turn*; the next, a *round turn and an elbow*; the next, *two round turns*, etc. A ship is said to have a *foul hawse* if her hawse is neither *open* nor *clear*. When the chains are in this condition, the *hawse* must be cleared by unwinding one of them from the other. To effect this a chain pendant, called the *clear hawse pendant*, is led out of one of the hawse pipes and by means of a large hook on the end firmly secured to one of the chains, usually the lee one (i.e., the one which is hanging slack, not the one by which the ship rides). The clear hawse pendant being made fast inside the ship, the lee chain is unshackled, and by means of a *dip rope* the end is *dipped* underneath the other and unwound from it. It is then brought into the ship and shackled to its other part again. This seems a very simple operation, but, owing to the great weight of the chain cables of large ships and to the fact that much of the work must be done in a boat, perhaps in quite rough water, it is a very laborious and troublesome one. To avoid the necessity of it, heavy swivels, called *mooring swivels*, are frequently used. This device has two shackles attached to the lower part and two to the upper. The chains are unshackled and the inner ends attached to the upper shackles of the swivel and the other ends to its lower shackles. The ship thus moored is free to swing without fouling her chains so long as the swivel is kept in order so that it will revolve with the ship. See MOOR; MOORING SWIVEL.

The **Hawse Buckler** is an iron plate, hinged to the upper edge of the hawse pipe on the outside of the ship and designed to close the hawse pipe against the admission of water when at sea. In recent ships the anchor is pulled up into the hawse pipe until the flukes take against the side of the ship, so no hawse bucklers are fitted. The **Hawse Hole** is the hole in sides of the ship through which the cable passes.

The **Hawse Pipe**. A heavy casting which

forms a lining for the hawse hole and prevents the cable from tearing the plating of the bow. In ships carrying their anchors stowed in the hawse pipes the latter are large enough to take three parts of the chain easily. This greatly facilitates putting on and taking off the mooring swivel.

HAWSER, *haz'er* or *has'er* (older forms *halser*, *haulser*, *halsier*, OF. *haulserce*, from *haulser*, *hausser*, Fr. *hausser*, It. *alzare*, to raise, from Lat. *altus*, high). A rope of manila fibre 4 inches or more in circumference, or a wire rope exceeding 3 inches in circumference. It was formerly the custom to call heavy ropes hawsers only when they were *hawser-laid*; i.e., when they consisted of three *plain-laid*, three-stranded ropes laid up left-handed. Large plain-laid ropes were called tow lines. Present practice is, however, less precise, all large ropes being commonly referred to as hawsers; and rope which was formerly called hawser-laid is now called *cable-laid*.

HAWTHORN (from AS. *hagþorn*, Ger. *Hagedorn*, from AS. *haga*, Eng. *hawe*, hedge + *þorn*, Eng. *thorn*), *Crataegus oxyacantha*. A shrub or small tree, native of Europe, Siberia, and northern Africa and sparingly introduced into the United States, which reaches a height of 25 feet. It has roundish obovate three to five lobed deciduous leaves, and corymbs generally of white, rose-colored, or sometimes deep-crimson flowers, succeeded by a small red fruit (*haw*) with yellow pulp, which, since they remain on the tree after the leaves have fallen, afford winter food to birds. Of the many varieties of hawthorn, the Glastonbury thorn—so named because supposed to have originated at Glastonbury Abbey—is remarkable for its early flowering, which in England often takes place in the middle of the winter. The common kind blossoms in May or June. The winter flowers are, however, not generally followed by fruit, and a second flowering often takes place in the



HAWTHORN.

same year. The common hawthorn is often popularly called "may," from the season of its flowering in England. It is also called "white-thorn," to distinguish it from the sloe or black-thorn. It is also sometimes employed as a stock

on which to graft apples and other pome fruit. The wood is very hard, close-grained, and takes a fine polish, but is apt to warp. A fermented liquor, which is very intoxicating, is made from the fruit in many parts of France. The hawthorn is particularly valuable as a hedge plant, for which purpose it is widely used in Great Britain, in consequence of its strong and plentiful spines, quick growth while young, its long life, and its ready adaptation to a variety of soils and especially to trimming. For this purpose it is propagated by seed. In the United States the name "hawthorn" is applied to nearly all the numerous species of *Crataegus*. See *CRATÆGUS*; *HEDGE*.

HAWTHORNE. A borough in Passaic Co., N. J., 2 miles north of Paterson, on the Erie and the New York, Susquehanna, and Western railroads (Map: New Jersey, D 2). There are railroad shops, glue and candy factories, dye mills, glassworks, etc. Hawthorne has adopted the commission form of government. Pop., 1900, 2096; 1910, 3400.

HAWTHORNE, CHARLES WEBSTER (1872-). An American genre and portrait painter, born in Maine. He started as office boy in a New York stained-glass factory, studied at night school and with Mowbray and Chase, and abroad in both Holland and Italy. He became a member of the National Academy in 1911 and in the same year was awarded the Thomas B. Clarke prize (of the academy). His winters were spent in Paris and New York, his summers at Provincetown, Mass., where he owned the Cape Cod School of Art. Among his works are: "The Trousseau," Metropolitan Museum, New York; "Mother and Child," Syracuse (N. Y.) Museum; "Net Mender," Rhode Island School of Design, Providence; "Venetian Girl," Worcester Museum; "The Family," Buffalo Fine Arts Academy. His technical facility is remarkable, and his interpretations of sitters and types show unusual ability to analyze character.

HAWTHORNE, JULIAN (1846-). An American novelist, born in Boston, son of Nathaniel Hawthorne. He entered Harvard in 1863, but did not graduate. He studied civil engineering in America and Germany, was engineer in the New York City Dock Department under General McClellan (1870-72), spent 10 years abroad, and on his return edited his father's unfinished *Dr. Grimshawe's Secret* (1883). While in Europe, he wrote the novels: *Bressant* (1873); *Idolatry* (1874); *Garth* (1877); *Archibald Malmaison* (1879); *Sebastian Strome* (1880). Of many novels written after his return to America, perhaps the most noteworthy are: *Noble Blood* (1884); *John Parmlee's Curse* (1886); *The Professor's Sister* (1888); *A Fool of Nature* (1899); *One of Those Coincidences and Other Stories* (1899). He wrote also: *Saxon Studies* (1876); *Nathaniel Hawthorne and his Wife* (1885); *Confessions and Criticisms* (1886); *American Literature* (1891); *a History of the United States* (1899, 1912); and *Hawthorne and his Circle* (1903). His experiences in the Federal prison at Atlanta were related in *The Subterranean Brotherhood* (1914). See MORTON, W. J.

HAWTHORNE, NATHANIEL (1804-64). An American romancer. He was born at Salem, Mass., July 4, 1804. He was of English descent, and his family had spelled their name "Hathorne," to which Nathaniel added the "w." His ancestor, William Hathorne, had accom-

panied Winthrop in the *Arbella* in 1630. He settled first in Dorchester, and moved thence to Salem (1637), where he received a large grant of land. He seems to have been a man of strong and energetic will, and a Puritan of the grimmest type. John, his son, was like him in abilities and disposition, took an active part in the persecution of witches at Salem, and was a magistrate as well as a soldier. Two of the Hawthornes were privateersmen during the Revolution. The novelist's father, Nathaniel Hathorne (1776-1808), was also a sailor and sea captain, and married Elizabeth Clark Manning, of Salem, whose ancestors had emigrated to America in 1679. They had three children, of whom Nathaniel was the second. Upon her husband's death, the mother took her children to her father's house, but of Nathaniel's boyhood we only know that he was fond of long solitary walks, and showed an hereditary longing for the sea. When he was 14 his mother went to live with his uncle, Richard Manning, at Raymond, Cumberland Co., Me. Nathaniel still cared more for nature than for study, hunted and roamed the woods, and jotted in his notebook impressions that show how close was his sympathy with nature, and how minute his observation. After a year here, he returned to Salem to prepare for college. He entered Bowdoin College in 1821, where he found three fellow students who were destined to exercise much influence on his future—Horatio Bridge, the poet Longfellow, and the future President, Franklin Pierce. His scholarship was good, especially in the classics. Upon his graduation (1825), he returned to Salem. Here he led a somewhat secluded life, and still indulged in long walks and in literary studies, in which he is said, at times, to have become so absorbed that food would be left for him before his locked door. He wrote much, but destroyed almost as much, for he could not satisfy his taste. *Fanshawe*, the first work of fiction that he committed to the press, was issued anonymously in 1828. About this time he began to write short stories and essays for the *Token*, a holiday annual under the direction of S. G. Goodrich. They were favorably received, but hardly justly appreciated. Goodrich persuaded Hawthorne to do some hack work for an *American Magazine of Useful and Entertaining Knowledge*, on which he worked for a time as editor (1836), at a salary of \$500, but the magazine was in difficulties before the year was out. For the same publisher he compiled, with the collaboration of his sister Elizabeth, a *Universal History*, the pay for which, \$100, he gave to his sister. Meantime his genius had been discovered by the London *Athenæum*, which quoted extracts from several of his most characteristic pieces, and with this encouragement and with the financial guaranty of Horatio Bridge, Goodrich brought out in 1837 the first collection of *Twice-Told Tales*. These were generously reviewed by Longfellow, who praised the author's genius and the beauty of his style; but they were received by the public with languid appreciation.

The slight returns from literature prompted Hawthorne to accept from the Collector of the Port of Boston, George Bancroft the historian, a post as weigher in the customhouse there, and in this office he measured coal, salt, and the like, at a salary of \$1200. Salem was strongly Federalist in politics, and Hawthorne, an hereditary Democrat, owed this position less to his own

abilities than to partisan policy. He performed his irksome work for two years (1839-41), but was dismissed on the advent of the Whigs to power. With a mind somewhat widened by this experience, he returned to Salem and to literature, and wrote a series of sketches of New England history for children, which he published as *Grandfather's Chair* (1841). In April of that year he was drawn to Brook Farm (q.v.). He invested \$1000 in the enterprise, his savings from the customhouse, and charmed his associates by his modest manliness; but, like the Miles Coverdale of his *Blithedale Romance*, a hardly disguised picture of this experiment, he was rather a looker-on than a participant. The genius of Brook Farm was discipline through society. Hawthorne's taste was for solitude, and after a year's patient experiment he left it, married Miss Sophia Peabody, of Salem, and made a home for himself at Concord, in the house that he has made memorable by his *Mosses from an Old Manse*. Here he wrote a second part of *Grandfather's Chair* (1842), and in 1842 published an enlarged collection of *Twice-Told Tales*. In 1845 he edited the *African Journal* of his old classmate at Bowdoin, Horatio Bridge, and in the next year published two volumes of *Mosses from an Old Manse*, the fruit of his scholarly leisure. Many of these sketches, however, had first appeared in the *Democratic Review*, from whose irregular payments he derived most of his income, till it failed, much in his debt (1845). These stories include such masterpieces in miniature as: *The Celestial Railroad*; *The Procession of Life*; *Roger Malvin's Burial*; *Rappaccini's Daughter*; *The Birthmark*; *Young Goodman Brown*; *The Artist of the Beautiful*, which, with some of the *Twice-Told Tales*, notably the four *Legends of the Province House*, first represent his mature genius. But they did not afford him a living, and after four years at Concord he returned in 1846 to the civil service, and accepted from the new Democratic administration the post of surveyor of the customhouse at Salem. There his powers ripened for three years, and reached their fullest expression in *The Scarlet Letter* (1850), the first draft of which he wrote before leaving his post. He has told the story of this period in the introduction to the novel with an irony not a little resented by his fellow citizens, to whom, indeed, he felt he owed no debt, having, been, he said, "deliberately lied down" by them till he was at last removed from office.

The Scarlet Letter, as written at Salem, seemed to him so sombre that he submitted to his friend and publisher, James T. Fields, in Boston, a proposal to print with it some sketches in lighter vein, that may now be read in *The Snow Image* (1852), but Fields was so deeply impressed by the work that he persuaded Hawthorne to revise and extend it, though he was skeptical enough to have the type distributed without stereotyping. The first edition of 5000 copies was sold in two weeks. The book was immediately reset, at once reprinted in England, and on both sides of the Atlantic was received with the greatest enthusiasm. It was Hawthorne's first sustained effort and his greatest. From this time till his death he devoted himself to writing, and found a ready market for his work. He moved in the summer of 1850 to Lenox, Mass., still eagerly seeking seclusion, save for the genial companionship of Herman Melville, who lived at Pittsfield. Here he wrote *The*

House of the Seven Gables (1851), a story of subtle power. The same year he wrote the juvenile *Wonder Book* published in 1852. In 1851 he left Lenox for West Newton, where he wrote *The Blithedale Romance* (1852), *The Snow Image, and other Twice-Told Tales* (1852); and in the spring of the next year went back to his old favorite Concord, where, with Alcott for his next-door neighbor, he wrote, by one of literature's ironies, a campaign *Life of Franklin Pierce* (1852), and also *Tanglewood Tales* (1853). He had declared that he would take no office in case of Pierce's election, but his friends made him think better of it, and he accepted from his old college mate the consulate at Liverpool.

The next seven years Hawthorne spent in Europe—five at the consulate, with little journeys to the English lakes and Scotland, two in France and Italy. A record of the English years remains in *English Note-Books* and *Our Old Home*. That of the Continent may be found in *French and Italian Note-Books*. The monumental work of this period is *The Marble Faun* (1860), published also in England under the title *Transformation*, a romance long popular, which, however, scarcely holds its own with the critics. When he returned to America on the eve of the Civil War, he found himself somewhat remote, both by nature and by political sympathy, from the intense passions of the period. He was, as he had ever been in public affairs, rather a looker-on than an actor. Very characteristic of his attitude is a little paper, "Chiefly About War Matters," printed in the *Atlantic Monthly* (1862), with some editorial excision and footnotes, which, though ascribed to the editor, are Hawthorne's own. Characteristic, too, of his aloofness from the passion of the time was his dedication to the then unpopular ex-President Pierce of *Our Old Home* (1863). This book indeed well expressed the feeling of New England for the Old. That the English did not like the book rather enhanced the interest in it in America. This was Hawthorne's last book. *The Dolliver Romance*, begun in the *Atlantic Monthly*, was incomplete at his death, as was *Dr. Grimshawe's Secret*, first printed in 1882. *Septimius Felton* also was rescued from loose sheets and printed, not as he would have had it, in 1871. These, and even more inchoate fragments, add nothing to his fame or achievements. He did little after the spring of 1864. His health failed rapidly, and he received a shock, from which he never recovered, by the sudden death of his friend and publisher, Ticknor, during a visit that they made together to Philadelphia. He had a premonition that his own death would be on a like journey, and so it befell. He went in May, with his friend Pierce, to the White Mountains; on the 18th they came to Plymouth, and there in his sleep Hawthorne died. He was buried in Sleepy Hollow Cemetery, Concord, on the 24th, where his body now lies, close to those of his friends Emerson and Thoreau.

Hawthorne's bearing and features were as noteworthy as his personality. His face had a romantic beauty, symmetrical, full and strong in feature, with a massive brow, and an expression that veiled power behind a poetic refinement. In manner he was shy but always self-possessed, quiet in conversation, and often silent in company. To the end, as in boyhood, he did not shun solitude, living much within himself and seeming to find no better company. The style was like the man, exquisite in its purity of dic-

tion, finely poetic, delicate, gentle; yet it had a manly gravity that bore witness to the inherited Puritan conscience. These qualities, subtly and strangely blended, give to his style a unique literary quality, and make him one of the greatest masters of English prose, in spite of the fact that when read continuously his elaborateness is sometimes found to cloy. Turning from the man to his work, one finds the dominant note, alike of the short tales and of the novels, well described by Henry James as a "feeling for the latent romance of New England." He found the shadow and the mystery in the Puritan conscience with its oppressive sense of responsibility and ingrained sin. It is the hidden passion, the secret impulse, the double life, the weird and supernatural imaginations, religion grown fierce in the struggle and isolation of early New England, out of which his poet's fancy loved to create symbolic impersonations. In the early tales, and to the last, he preferred to explore the dark corners of the human heart rather than to describe the expression which they found in social relations. Something of this tendency could be detected in *Fanshawe*, but its quintessence is in the tales of old Massachusetts, *Goodman Brown*, the *Legends of the Province House*, or in the more whimsically humorous *Village Uncle*, and *A Rill from the Town Pump*. When he went abroad for his scenes, he carried New England with him. *Rappaccini's Daughter* has in it as little of the atmosphere of Italy during the Renaissance as *Roger Malvin's Burial*; and when we turn to the novels it is still the romance of the Puritan conscience in its self-tormenting of which we read first and supremely in *The Scarlet Letter*, with its climax of penance and demoniac triumph at Dimmesdale's shame. And that study of sin festering in darkness, shunning the antidote, and seeking vainly the anodyne, has its counterpart there in Hester Prynne, who finds in sin itself the power of a higher spiritual life; while her child is a joyous and perennially fascinating mystery. *The House of the Seven Gables* is no less characteristic, though the noonday light is here softened to a mystic glow, and we breathe a ghostly atmosphere of vicarious sorrow and atonement. *The Blithedale Romance*, too, could have been dreamed only in New England, and of *The Marble Faun* one must say with Henry James, that Hawthorne "took with him to Italy more of the old Puritan conscience than he left behind." One feels it in Donatello, and it is in every fibre of Hilda's being. Here, as always, moral guilt, and its effect upon the individual alone with himself, is the theme on which the reader's thought is concentrated with vague yet persistent shadowings of the supernatural and weirdly fascinating revelations of the depths of human souls, around which the Italian scene throws the glamour of antiquity. And as we find New England in this story of Italy, so we find it in the point of view of the *Note-Books*. While he was at home he sought relief from the present in the past; when he was abroad, he viewed the new scene from the standpoint of the old, and looked at English, French, and Italian society with the same aloofness that marked his attitude towards American politics and the socialistic aspirations of the Transcendentalists. He was less a moralist than a dilettante in morals, without dogmatism, without insistence, "outside of everything, an alien everywhere, an æsthetic solitary" (Henry James).

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HAWTREY, CHARLES HENRY (1858-). An English actor-manager and playwright, born at Eton, and educated there and at Oxford. At the age of 23 he made his theatrical début. His plays include *The Private Secretary*, *Jane*, and *Mr. Martin*, the first of which was originally produced in Cambridge in 1883 and was an adaptation from Von Moser's *Der Bibliothekar*. It proved a tremendous success and was performed 844 consecutive times. In 1884 a compromise was arranged by which William Gillette's adaptation of the same play could be produced in America. Some years later Hawtreay got control of the Comedy and Avenue theatres in London. During the season of 1901-02 he brought his company to New York with *A Message from Mars*, which had already run for 500 performances in London, and in 1913 he played in *Gen. John Regan* and *Never Say Die*.

HAXO, ak'só', FRANÇOIS NICOLAS BENOÎT, BARON (1774-1838). A French general of engineers, born in Lorraine. He fought in the armies of the Republic, first in Germany and afterward under the First Consul in Italy. His ability was recognized by Napoleon, who sent him to Turkey in 1807 to fortify Constantinople for the Sultan. At the end of the year he returned to Italy, and in 1808 was sent to Spain, where he took an active part in the capture of Saragossa, and was promoted colonel. In 1811 he was made Baron, and in the same year, as commander of engineers in the army of Germany, he inspected the fortresses held by the French in Prussia and Poland. Many of them he strengthened, particularly those at Modlin and Danzig; and in the latter he introduced casemate batteries of his invention which were later adopted for the fortresses of France. During the retreat from Moscow he received from Napoleon the brevet rank of general of division, and in June, 1813, he was made commander in chief of the engineers of the Imperial Guard. After the Peace of 1814 the Bourbons gave him employment, but on Napoleon's return from Elba he joined the Emperor and fought under him during the Hundred Days. Nevertheless, upon Napoleon's final overthrow, the Bourbons

again received him into their service and made him inspector general of fortifications. In the discharge of this office he worked so strenuously to modernize the fortresses of France that General Rogniat said of him: "Peace was for him more laborious than war." He proposed the method of fortifying Paris which, with some modifications, was finally adopted, and in 1832 he conducted the celebrated siege of Antwerp. He left a number of writings on military engineering and analogous subjects.

HAXTHAUSEN, häkst'hou'zen, AUGUST (FRANZ LUDWIG MARIA), BARON VON (1792-1866). A German economist, born near Paderborn. He studied mining at Klausthal and went to the University of Göttingen. His first book, *Die Agrarverfassung in den Fürstentümern Paderborn und Corvey* (1829), procured him commissions for similar studies in Prussia and Russia, summed up in *Die ländliche Verfassung in der Provinz Preussen* (1839) and *Studien über die innern Zustände des Volkslebens und insbesondere die ländliche Einrichtungen Russlands* (1847-52; in English version, *The Russian Empire*, 1856). He also wrote on the Caucasus two volumes translated into English under the titles *Transcaucasia* (1854) and *The Tribes of the Caucasus* (1855). He edited a series of essays called *Das konstitutionelle Prinzip* (1864).

HAY (AS. *hig*, Goth. *hawī*, OHG. *hewi*, *howwi*, Ger. *Heu*; probably connected with AS. *hēawan*, OHG. *howwan*, Ger. *hauen*, Eng. *hew*). A term applied to a considerable number of cured crops used for feeding farm animals. The most important hays are made from the various grasses (timothy, meadow fescue, meadow foxtail, brome grasses, etc.), legumes (clover, alfalfa, etc.), and cereal grains (rye, oats, and barley). The different crops should be cut for hay before they have fully ripened seed, as, generally speaking, the nutritive value increases up to this time and decreases afterward. (See GRASSES.) While most crops will not cure unless they are cut and treated in the usual way, some grasses, e.g., Buffalo grass, dry in their natural habitat without appreciable loss of nutritive material,

and constitute fairly good natural hay. If the cereal grains are allowed thoroughly to ripen before cutting, and the grain separated, the material is called straw, and is not as valuable for feeding as hay. Hay is cured by exposing the cut crop to the sun and air. The processes of haymaking vary with the crop and climatic conditions. The varying nature of the crops converted into hay, the dampness or dryness of the soil, the amount of moisture in the atmosphere, and the duration and intensity of the sunlight are all factors which influence the problem. At the present time haymaking is quite generally carried on by the aid of machinery. (See REAPERS, REAPING; IMPLEMENTS, AGRICULTURAL.) Generally speaking, hay is cured in the United States by spreading on the ground. In some parts of northern Europe, in the Mackenzie River region of Canada, and elsewhere, where the rainfall is very abundant, hay is cured on racks. During the curing process the green crops lose water, which is, perhaps, the most marked change. However, there are other changes, which are due to the action of ferments. These modify more or less the composition of the hay and aid in developing the peculiar aroma. It has been found that grass which is merely dried does not have exactly the same composition as a similar sample which has been cured as hay. Fermentation, which begins in the field, often continues after the hay is stored. As in many other chemical changes, fermentation is accompanied by the liberation of heat, and in the case of hay the temperature may rise sufficiently to cause ignition. Many fires have been caused by the spontaneous combustion of hay owing to this cause. Though frequently a single grass or other crop is planted for hay, meadows often have a number of crops growing together as grasses and clovers, and these yield what is termed mixed hay. The hay from salt marshes consists of such plants as black grass (*Juncus gerardi*), fox grass (*Spartina patera*), branch grass (*Distichlis spicata*), flat sage (*Spartina stricta maritima*), etc. The average composition of a number of sorts of hay follows:

AVERAGE PERCENTAGE COMPOSITION OF A NUMBER OF SORTS OF HAY FROM GRASSES, LEGUMES, AND CEREAL GRAINS

KIND OF HAY	Water	Protein	Fat	Nitrogen-free extract	Crude fibre	Ash
GRASSES						
Hay from mixed grasses.....	15.3	7.4	2.5	42.1	27.2	5.5
Timothy.....	13.2	5.9	2.5	45.0	29.0	4.4
Orchard grass.....	9.9	8.1	2.6	41.0	32.4	6.0
Kentucky blue grass.....	21.2	7.8	3.9	37.8	23.0	6.3
Meadow fescue.....	20.0	7.0	2.7	38.6	25.9	6.8
Salt-marsh hay.....	10.4	5.5	2.4	44.0	30.0	7.7
Rowen.....	16.6	11.6	3.1	39.4	22.5	6.8
CEREAL GRAINS						
Barley hay, cut in milk.....	15.0	8.8	2.4	44.9	24.7	4.2
Oat hay, cut in milk.....	15.0	9.3	2.3	39.0	29.2	5.2
Rye hay.....	10.6	9.3	2.5	8.7	23.6	5.3
LEGUMES						
Red clover.....	15.3	12.3	3.3	38.1	24.8	6.2
White clover.....	9.7	15.7	2.9	39.3	24.1	8.3
Crimson clover.....	9.6	15.2	2.8	36.6	27.2	8.6
Alfalfa.....	8.4	14.3	2.2	42.7	25.0	7.4
Cowpeas.....	10.7	16.6	2.9	42.2	20.1	7.5
Soy bean.....	11.3	15.4	5.2	38.6	22.3	7.2
Pea vine.....	15.0	13.7	2.3	37.6	24.7	0.7
Vetch.....	11.3	17.0	2.3	36.1	25.4	7.9
Serradella.....	9.2	15.2	2.6	44.2	21.6	7.2
Peanut vines (without nuts).....	7.6	10.7	4.6	42.7	23.6	10.8
Sanfoin.....	15.0	14.8	3.0	39.5	20.4	7.3
Alsike clover.....	9.7	12.3	2.9	40.7	25.0	8.3

Hay contains more nutritive material in proportion to its bulk than the green crops from which it is made. In other words, it has been concentrated by the evaporation of a large amount of the water originally present. It contains fairly large amounts of carbohydrates, both nitrogen-free extract and crude fibre, and a considerable amount of protein. The latter constituent is especially abundant in hay from leguminous crops. The different sorts of hay are very important feeding stuffs for all classes of farm animals. They are valuable not only for the nutrients they contain, but because, like all coarse fodders, they furnish the needed bulk in the ration. In early times animals were wintered on hay alone, but experience has shown that although farm animals may be maintained without other feeding stuffs, if it is desired to produce gains in weight or an abundance of milk, hay must be supplemented by grain or other concentrated feed.

Rowen, i.e., hay made from second-growth grasses or aftermath, is especially rich in nutrients; but it is made at a time of the year when the ground is often damp, the days shorter, and the sun's heat less strong than earlier in the season. This renders the curing of rowen somewhat difficult, and the product is usually of less value for some purposes than first-crop hay. When cured under favorable conditions, rowen hay is an excellent article for winter feeding. In Switzerland and other parts of Europe it is customary to cut the soft grasses commonly grown a number of times during the season. The resulting hay is fine, relatively rich in protein, and is said to be especially relished by stock. New-made hay is laxative, and should be fed cautiously to work horses or to driving horses. The average coefficients of digestibility of a number of sorts of hay follow:

a reasonable allowance of steamed or boiled and chopped alfalfa or clover hay. The boiling or steaming increases the palatability of the feed, though it probably does not increase its digestibility. Cooked clover hay is often given to poultry with advantage. In general it does not pay to steam or cook hay for stock. Alfalfa hay is sometimes ground to meal with or without the addition of molasses.

"Hay tea," properly made, has been successfully used for rearing calves in place of milk. The tea should be supplemented by ground flaxseed and middlings cooked in it.

Hay is commonly stored under cover or in stacks in the open field. It is now generally baled for shipping, in which form it is conveniently handled and stored.

HAY, FRANCIS (?-1631). A Scottish nobleman, ninth Earl of Errol, identified with attempts to reestablish the Roman Catholic religion in his native country. He became a convert to that religion, and after succeeding to the earldom in 1585 he joined Huntly in the attempt to induce Philip II of Spain, after the defeat of the Armada, in 1588, to fit out another expedition for the conquest of England. On discovery of his treachery, he was summoned before the Council to answer the charge of attempting to subvert the Protestant religion, and upon refusing to appear he was denounced as a rebel. The Earl's career from 1589 to 1617 was little more than a series of attempts to carry out his main design, during which he engaged in conspiracies, fomented rebellions, was tried, imprisoned, and afterward released. The Scottish King, James (afterward James I of England), was unwilling to exercise extreme severity upon Errol, though he knew of his guilt, and warned him of the futility of his attempts. After an abortive rebellion, in which the Earl and Huntly

AVERAGE DIGESTIBILITY OF A NUMBER OF KINDS OF HAY, SHOWN BY THE PERCENTAGES OF DIGESTED CONSTITUENTS

KIND OF HAY	Dry matter	Protein	Fat	Nitrogen-free extract	Crude fibre	Ash
GRASSES						
Timothy	56.6	46.9	52.2	62.3	52.5	32.8
Timothy rowen	62.2	68.0	49.5	63.4	66.5	56.4
Orchard grass	56.6	59.5	53.8	55.4	60.4	...
Pasture grass	72.6	73.4	67.3	74.2	76.1	51.8
Mixed grasses	57.1	58.5	48.5	58.7	59.7	...
Salt-marsh hay	58.4	42.6	29.7	54.7	60.7	69.8
Rowen	64.4	69.1	47.4	66.2	66.6	46.6
CEREAL GRAINS						
Barley	61.2	65.2	40.5	63.3	61.7	44.8
Oat	49.3	54.2	61.9	52.0	43.5	34.6
LEGUMES						
Red clover	57.4	58.0	55.2	64.4	54.2	29.1
Red clover rowen	58.0	64.8	59.8	62.8	47.4	45.8
Alsike clover	62.2	66.1	50.2	70.7	53.5	52.2
Alfalfa	58.9	72.0	51.0	69.2	46.0	39.5
Cowpea vine	59.2	64.8	51.8	70.6	42.0	49.5

Hay is fed "long," i.e., whole, or "chopped," i.e., more or less finely cut. Where a large number of animals are fed, chopping has some advantages. If a little water is added to the chopped hay it lays the dust. Meal may be added to the moistened chopped hay. Such a ration is especially recommended for hard-worked horses which are in the stable only at night. If animals have abundant time for chewing and digesting, chopping is not very desirable. Growing pigs and breeding swine are often benefited by

were the leaders, the former was sent to prison in Edinburgh Castle for an alleged share in Bothwell's attempt to capture Falkland Palace while the King was occupying it. In 1592 he was again denounced as a rebel for alleged complicity in Spanish intrigues, but was finally ordered to choose between exile and accepting the Protestant religion. Having failed to make a choice, he was declared a traitor. The Earl and Huntly rebelled in 1594, and defeated a force sent against them by the King. Soon afterward

they fled the country, but returned in 1596, and the following year Errol, having complied with the King's conditions by abjuring his religion and subscribing to the Confession of Faith, was restored to his rights and possessions. The genuineness of his profession was, however, doubted by the Scottish Kirk, and after various unsuccessful attempts to satisfy themselves on that point, Errol was in 1608 excommunicated and imprisoned in Dumbarton Castle, but was finally released in 1611 and in 1617 he was absolved from excommunication. He died July 16, 1631.

HAY, GEORGE (1729-1811). A Scottish Catholic bishop and polemical writer, born of Protestant parentage in Edinburgh, where he was educated and apprenticed to a surgeon. He became a Catholic, studied in Rome, and, in 1778, after the death of Bishop Grant, became Vicar Apostolic of the Lowlands. A year later his chapel houses were mobbed and burned and his library ruined by fanatics, who were aroused by the fear that government purposed more lenient treatment of the Catholics. Hay was influential in the reestablishment of the Scots College at Rome, and in building a Catholic seminary at Aquhorties (1799). He wrote *The Scripture Doctrine of Miracles* (1775) and *The Sincere, Devout, and Pious Christian* (1781-86), a work still esteemed in the Catholic church. A complete edition of his works with a memoir was published in five volumes at Edinburgh (1871-73).

HAY, JAMES, EARL OF CARLISLE (c.1575-1636). An English diplomat and favorite of James I. He was born at Pitscorthy, Fifeshire, and educated in France. James knighted him, took him to England, gave him a rich wife, Honora, heiress of Sir Edward Denny, and repeatedly paid off the debts which Hay, who was an easy-going spendthrift, was always making. In 1619, soon after his creation as Viscount Doncaster, he was sent on a mission to Bohemia, where James's son-in-law, Frederick of the Palatinate, was for a short time King. A little later we find him in France (1621-22), exerting himself unsuccessfully in an effort to make peace between Louis XIII and the Huguenots. He was made Earl of Carlisle in 1622 and was sent back to Paris two years later to arrange a marriage between Charles and Henrietta Maria, and advised the King against promising Richelieu that there should, in event of the marriage, be any abatement of laws against Catholics. Carlisle seems to have distrusted the French alliance now as strongly as he had before desired it; and he retired from politics when it became apparent that the court policy was for peace with France. The title of Carlisle became extinct on the death of his son James (1660). See HAY, LUCY.

HAY, JOHN (1838-1905). An American statesman, author, and journalist. Born in Salem, Ind., of Scottish ancestry, Oct. 8, 1838, he graduated from Brown University in 1858 and studied law at Springfield, Ill., where he became acquainted with Abraham Lincoln, then the leader of his profession and of the Republican party in Illinois. In 1861 he was admitted to practice in the Supreme Court of Illinois. He accompanied President-elect Lincoln to Washington and was his assistant private secretary until his (Lincoln's) death, with the exception of a brief interval during which he served as adjutant and aid-de-camp to the President and of a few months when he served in the army under

Generals Hunter and Gillmore. He rose to the rank of major and was later brevetted lieutenant colonel and colonel. After Mr. Lincoln's death he went to Paris as Secretary of Legation (1864-67). He then served (1867-68) as Secretary of Legation and chargé d'affaires at Vienna, and after a short interval went in the same capacity to Madrid, where he remained until 1869. From 1870 to 1875 he was an editorial writer on the New York *Tribune* and for a short time acted as editor in chief of that journal as substitute for Horace Greeley. In 1874 he married the daughter of Amasa Stone, of Cleveland, Ohio. From 1879 to 1881 he served under President Hayes as First Assistant Secretary of State; then until 1883 he acted in Whitelaw Reid's place as editor of the *Tribune*; and afterward for 16 years he was engaged in literary work, chiefly in preparing a biography of Lincoln. On March 19, 1897, he was appointed by President McKinley Ambassador to Great Britain, to succeed Thomas F. Bayard. His 18 months' service in this capacity was marked by thoroughness, skill, and tact, and did much to cement relations with Great Britain and to increase the diplomatic prestige of the United States. On Sept. 20, 1898, he was appointed Secretary of State, to succeed William R. Day, who had just resigned. His conduct of the foreign affairs of the nation was characterized by unusual vigor and foresight. He at once made a *modus vivendi* concerning the Canadian-Alaskan boundary. Perhaps his greatest diplomatic achievement was when in September, 1899, he secured the "open-door" policy in China by the written guarantees of the European nations, and prevented the Empire from being dismembered. In this the United States for the first time acted in concert as a world power. During the British war in South Africa he used his good offices to secure the neutrality of the continental European powers. When the United States began negotiations to build the Panama Canal, he negotiated a treaty with England (see HAY-PAUNCEFOTE TREATY) that made this possible. Again, when Colombia refused to ratify the canal concessions to the United States in 1900, he was influential in having the new Republic of Panama recognized and in completing negotiations for the canal. In 1902 he called on the European Powers to prevent atrocities on the Jews in Rumania; in the same year he settled a dispute between Europe and Venezuela by upholding and extending the scope of the Monroe Doctrine; he was instrumental in establishing a Philippine policy; and largely through his efforts an arbitration court was re-established at The Hague. In all, he brought about more than 50 treaties, including the settlement of the Samoan dispute, as a result of which the United States secured Tutuila, with an excellent harbor in the Pacific; a definitive Alaskan boundary treaty in 1903; the negotiation of reciprocity treaties with Argentina, France, Germany, Cuba, and the British West Indies; the negotiation of new treaties with Spain; and the negotiation of a treaty with Denmark for the cession of the Danish West India Islands. Mr. Hay died July 1, 1905.

Mr. Hay was the author of *Pike County Ballads* (1871); *Castilian Days* (1875); a translation of Emilio Castelar's treatise on the Republican Movement in Europe (1875); and (with John G. Nicolay) he wrote an authoritative life of Lincoln, entitled *Abraham Lincoln: A History* (9 vols., 1890). He was one of the seven orig-

inal members of the American Academy of Arts and Letters. Consult Lorenzo Sears, *John Hay, Author and Statesman* (New York, 1914).

HAY, JOHN. See TWEEDDALE, MARQUIS OF.

HAY, LUCY, COUNTESS OF CAELISLE (1599-1660). An English political intriguer, daughter of Henry Percy, Earl of Northumberland. At the age of 18, much against the will of her imprisoned father, she married James Hay (q.v.). Cartwright, Herrick, Carew, and Suckling sang of her beauty and wit. She soon gained a high place in the favor of the Queen and did much for Strafford with her influence. When Strafford was dead, she became the spy and servant of the Parliamentary party, which she warned of the plan to arrest the five members. In both civil wars she was intimate with the aristocratic Presbyterian party and intrigued in behalf of Holland. In 1649 she was arrested, imprisoned, and threatened with the rack, and was held in confinement until 1652.

HAY, OLIVER PERRY (1846-). An American paleontologist, born at Saluda, Jefferson Co., Ind. He studied at Eureka (Ill.) College, Yale, and Indiana University (Ph.D., 1884); taught in several institutions, being professor of biology and geology at Butler College, Indianapolis (1879-92); was at the Field Museum, Chicago (1895-97), and assistant and associate curator of vertebrate paleontology at the American Museum of Natural History, New York (1901-07); for four years was engaged in private investigations; and in 1912 became research associate at the Carnegie Institution, Washington. He assisted in geological surveys of Arkansas, Indiana, and Iowa, was associate editor of the *American Geologist* in 1902-05, and published *Bibliography and Catalogue of the Fossil Vertebrata of North America* (1902) and *The Fossil Turtles of North America* (1908).

HAYASHI, hā'yā-shē, COUNT TADASU (1850-1913). A Japanese diplomat, born at Sakura and educated in England. After holding minor offices he was Assistant Minister for Foreign Affairs in 1891-95, Minister to China in 1895-96 and to Russia in 1897-99. In the latter year he represented Japan at The Hague Peace Conference and from 1900 to 1905 was Ambassador to England. He helped to bring about, and signed, the treaties of alliance of Jan. 20, 1902, and Aug. 12, 1905, between Great Britain and Japan (q.v.). He was Minister of Foreign Affairs in the Saronji cabinet in 1906-08 and Minister of Commerce in 1911-13. In 1896 he was made Baron, in 1902 Viscount, and in 1907 Count.

HAY ASTHMA. See HAY FEVER.

HAY BOTE, or HEDGE BOTE (from hay, AS. *hege*, OHG. *hag*, Ger. *Hag*, Eng. *haw*, hedge + ME. *bote*, Eng. *boot*, advantage, recompense). A common-law right of a tenant for life or years to cut timber for the repair of hedges and fences. Such a tenant is restrained by the law of waste from cutting timber, or woods suitable for building, excepting for certain specified purposes included in the ordinary use and upkeep of the premises, as for firewood, necessary repairs, and the like. The excepted cases were known as botes, or estovers. See ESTOVER.

HAYDEN, FERDINAND VANDEVEER (1829-87). An American geologist, born in Westfield, Mass. Graduating from Oberlin College in 1850, he studied medicine at Albany, N. Y., and in 1853 commenced a series of scientific explorations by an examination of the remains of extinct animals found in the Bad Lands of Dakota.

The next three years were passed in a similar exploration of the upper Missouri, resulting in the discovery of an important collection of fossils, which was afterward divided between the academies of science of St. Louis and Philadelphia. Being appointed geologist of a government expedition to the Northwest, he acted in this capacity until the outbreak of the Civil War, when he entered the Union army as a surgeon. He rose to be chief medical officer of the Army of the Shenandoah. In 1865, and until 1872, he was professor of geology and mineralogy in the University of Pennsylvania, vacating this post on account of his duties in connection with exploratory work in the West. In 1867 he had been placed in charge of a geological survey of Nebraska which was the beginning of a much broader survey, known as the Geological Survey of the Territories, and for which from 1869 to 1872 he conducted explorations in Dakota, Wyoming, Colorado, and Utah. One of the results of this work was the establishment of the Yellowstone National Park as a government reservation. From 1873 to 1879 he served as director of the Territorial survey, and in the latter year, when the present United States Geological Survey was organized, he became geologist in charge of the Montana division. He resigned from public office in 1886. His papers and reports on the geology and other natural features of the West are numerous, the more important being incorporated in 10 volumes of *Reports of the United States Geological Survey of the Territories*.

HAYDN, hā'd'n, JOHANN MICHAEL (1737-1806). An Austrian musician, brother of Josef Haydn, born at Rohrau. From 1745 to 1755 he was a chorister at St. Stephen's, Vienna, and, after studying the violin and organ, assistant organist there. In 1757 he was kapellmeister at Grosswardein, in 1762 concertmeister to Archbishop Sigismund at Salzburg, and in 1777 organist of the cathedral and of St. Peter's Church in that city. In 1800 his property was destroyed by the French occupation of Salzburg, but his brother and friends and the Empress Maria Theresa came to his assistance, and he was enabled to open a school of composition. This enterprise was very successful, among its pupils being Weber and Reicha. His best works were his oratorios, masses, cantatas, and anthems, which his brother held in the highest estimation. He published little, but his compositions embrace almost every department of music. Consult O. Schmid, *Joh. Michael Haydn: Sein Leben und Wirken* (Langensalza, 1906).

HAYDN, JOSEF (1732-1809). A famous Austrian composer. He was born at Rohrau, Lower Austria, March 31, 1732. His father was a traveling wheelwright, with a natural love of music. The sweetness of the boy's voice and his correct ear for pitch were noted early. His cousin, Matthias Frankh, a schoolmaster and choirmaster in Hainburg, took the lad, whom the father had destined for the Church, to his home for musical instruction. Though treated at times with much harshness, he undoubtedly was started on his career by Frankh.

From his eighth to his eighteenth year Haydn was a pupil in the choir school of St. Stephen's, Vienna, Kapellmeister Reutter having heard him sing in Hainburg. Though wretchedly poor and often without sufficient food, he studied diligently and at 13 composed a mass. When his voice broke, Reutter made his boyish prank in cutting off a fellow pupil's queue the occasion

for his dismissal. A former chorister whom he chanced to meet took him in, and a kind-hearted tradesman, named Buchholz, loaned him 150 florins. Haydn not only repaid the loan, but years afterward remembered Buchholz's granddaughter in his will. Gratitude, tolerance, and the never-failing good humor which is reflected in his music, and which even a wretched marriage could not mar, mingled in his nature.

Through Metastasio, the Italian poet and librettist, Haydn secured pupils, himself taking lessons in composition from Porpora, for which he paid by menial duties. In 1758 his circumstances changed for the better. Through Baron Fürnberg, for whom he had composed his first quartet, and Countess Thun, he was appointed musical director to Count Franz Morzin, for whose orchestra he wrote his first symphony. It was during this incumbency that he married the eldest daughter of a Viennese wigmaker, named Keller. He had loved the younger daughter, but she entered a convent, and urged by her father he married her sister instead. His wife was utterly unsympathetic and unworthy of him. She tore up his manuscripts for curl papers and pie forms, squandered his earnings for finery, and even selected a house to live in in anticipation of her widowhood. By an irony of fate Haydn survived her and went to live in this very house.

In 1760 he became kapellmeister to Prince Paul Anton Esterházy and retained this position under his original patron's successors till near the time of his death. Prince Nikolaus played upon the barytone (a stringed instrument superseded by the cello), and for this instrument alone Haydn wrote 175 pieces. For operatic performances in the princely household he composed more than a dozen operas, and for concerts numerous symphonies, quartets, and sonatas.

Haydn and Mozart became acquainted in 1781, and from then until Mozart's death a close and generous friendship existed between them. Beethoven (q.v.) was a pupil of Haydn's for about a year, but, despite the fact that the latter praised some of his compositions, he soon grew dissatisfied with his teacher. Haydn's fame, however, steadily increased, and when, in December, 1791, he arrived in London under engagement to Salomon the violinist, he was the musical lion of the season, as he was also on his second visit, in 1794. His *Salomon* symphonies were composed for his London concerts. The famous Austrian national anthem he composed in 1797, and in 1798 he produced his greatest work, the oratorio *The Creation*, following it with *The Seasons* in 1801. His last years were ailing, and his undermined constitution could not stand the shock of the bombardment of his beloved Vienna by the French in May, 1809. After the third shot he fell into convulsions, and on May 31 he died. For almost a century after his death Haydn was regarded as the "Father of the Symphony" and the "Father of the Modern Orchestra." The recent rediscovery of the works of Stamitz (q.v.), who was born 15 years before Haydn, establishes beyond a doubt the claims of the latter to both these honors. As a matter of fact, the earlier works of Haydn are much inferior to those of Stamitz. Only gradually did Haydn's genius unfold itself, more especially after his acquaintance with Mozart, whom he venerated beyond everything and whom he regarded as the greatest musical genius the world had ever seen. Haydn adopted

Stamitz's style and form (the "sonata form") and his individual treatment of the orchestral instruments without adding anything of his own on the mere technical side. His inborn genius, however, filled these forms with such content that before long Stamitz fell into undeserved oblivion. Haydn, though not the creator of the new instrumental style, still maintains his lofty position in the history of music as the earliest of the really great masters of the new style. The prevailing note of his music is joyousness, frequently mingled with droll and even boisterous humor; he never compasses the sublime and occasionally merely hints at the tragic.

Haydn was honored even during his lifetime by a monument erected near his birthplace by Count Harrach, in whose service his mother had been. He attended the unveiling on his return from his first London season. His musical output was enormous. It included 104 symphonies, 77 string quartets, 66 divertissements, 16 concert overtures, 51 concertos for various instruments with orchestra, 68 trios for various combinations of instruments, 12 sonatas for violin and piano, 33 sonatas for piano, and an endless number of smaller pieces. Besides the oratorios already mentioned, he wrote *Il ritorno di Tobia*, 26 masses, 2 requiems, and a great number of motets and sacred arias. His 24 operas and his songs are forgotten to-day. *Die sieben Worte am Kreuze*, originally written as a symphony, was later changed to an oratorio by his brother Johann (q.v.). In 1908 Breitkopf and Härtel, of Leipzig, began the publication of the first complete edition of Haydn's works (estimated to comprise more than 80 volumes). The editor is E. von Mandyczewski. Many works have never been published, and as recently as 1913 an unknown symphony was discovered.

Bibliography. C. F. Pohl, *Mozart and Haydn in London* (Vienna, 1867); id., *Josef Haydn* (2 vols., Leipzig, 1875-82); Nohl, *Life of Haydn* (trans. by Upton, Chicago, 1880); L. Schmidt, *J. Haydn* (Berlin, 1907); M. Brenet, *Haydn* (Paris, 1909); F. H. Cowan, *Haydn* (New York, 1912).

HAYDN, BENJAMIN ROBERT (1786-1846). An English historical painter. He was born at Plymouth, Jan. 26, 1786, the son of a printer and publisher. He was educated at Plymouth and at Plympton. While an apprentice to his father, he was attacked by a malady that caused a dimness of vision which in after life prevented his executing small pictures. In 1804 he went to London and spent two years studying, drawing from the cast by himself, attending the Academy schools and the lectures on anatomy by Charles Ball. He was one of the first of the English artists to appreciate the Elgin Marbles, and it was largely through his efforts that they were acquired by the nation. From his studies of them he received inspiration for the painting "Dentatus" (1809), which brought him a premium of 100 guineas at the Academy Exhibition. But he was never elected a member of the Academy, owing to his constant quarrels with the members. His quarrel with the Academy was further aggravated by various slights, and by letters written by himself for publication, which alienated many of his powerful friends. In 1821 he married Mary Hymans, a beautiful widow, who did much to lighten his disappointments in life.

His life was an heroic struggle against adverse circumstances, partially the fault of others, but also as a result of his unscrupulousness in money matters, vanity, and egotism. His *Journal*, consisting of 26 manuscript volumes, contains a vivid record of this struggle. He painted only very large historical canvases, which involved him in debt, and he was several times an inmate of the debtors' prison. During his second confinement he painted the "Mock Election," which George IV purchased for 500 guineas.

Although his ability was not recognized by the Academy, he numbered among his admirers such men as Keats and Wordsworth, both of whom wrote sonnets to him, Sir Walter Scott, Charles Lamb, Southey, Hazlitt, and Mrs. Siddons. They especially appreciated his ambitious plans for the promotion of British art, which he inculcated in his letters, pamphlets, books, and lectures. Among his published works the best known is his *Lectures on Design* (London, 1844-6), delivered at the Mechanics' Institute at London, and often repeated, not only in the principal cities of England, but at the University of Oxford. As a teacher, he was equally successful, numbering among his pupils Sir Charles Eastlake, Charles and Thomas Landseer, William Harvey, George Lance, and William Berwick. But although his ideas on schools of design and the decoration of the Houses of Parliament were adopted, he was neglected when it came to carrying them out. His cartoons for the latter were rejected. He struggled through life, mostly in great poverty, and finally, overcome by the mental strain consequent on the failure of the exhibition of his last two pictures, he committed suicide in the Thames, June 22, 1846.

Haydon was the greatest British historical painter of his day. His aims and ideals were lofty, and with the advantage of good technical training (such as certain continental schools afforded) he might have achieved wonders. As it was, his art was deficient in pictorial qualities. Haydon's drawing shows knowledge of anatomy, although it is often defective in proportions; his color, at times rich, is not always harmonious; his conceptions are always vigorous, but the execution is very unequal. The works which attracted most attention during his lifetime were: "Joseph and Mary Resting on the Road to Egypt" (1806); "Dentatus" (1809); "Romeo and Juliet" (1809); "Judgment of Solomon" (1814); "Christ's Entry into Jerusalem" (1820), now in Philadelphia; "Lazarus" (1882), now in the National Gallery; "Christ Blessing Little Children"; the "Anti-Slavery Society at Freemasons' Hall" (1840), now in the National Portrait Gallery. Among his other works are "Venus and Anchises"; "Alexander and Bucephalus"; "Napoleon at St. Helena." Metropolitan Museum, New York; "Cassandra"; "Xenophon"; "Eucles," National Gallery; "The Mock Election"; "Maid of Saragossa"; "Banishment of Aristides"; "Nero playing the Lyre during the Burning of Rome." Consult: Haydon's *Correspondence and Table Talk*, edited by his son, F. W. Haydon (London, 1876); Tom Taylor, *Life of Haydon* (ib., 1883); Redgrave, *A Century of Painters of the English School* (ib., 1866); Symonds, *B. R. Haydon and his Friends* (New York, 1905).

HAYDUCKS, hā'dyks. See HADUKS.

HAYE, L. M. DE LA. See CORMENIN.

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HAYEL, hā'yēl, or **HAIL**, hā'el. Capital of the Sultanate of Shomer, situated in the northern part of Arabia, about 250 miles northeast of Medina, 3550 feet above sea level (Map: Turkey in Asia, E 5). It is a walled town, a place of considerable trade, and summer residence of the emir. Pop., 25,000.

HAYEM, ā'yān', GEORGES (1841-). A French physician, born in Paris. He was educated at the University of Paris, where in 1879 he became a professor in the faculty of medicine. He was made a physician of the Saint-Antoine Hospital and in 1886 was elected a member of the Academy of Medicine. From 1873 to 1898 he edited the *Revue des sciences médicales en France et à l'étranger*. He also became an Officer in the Legion of Honor. His works include: *Des hémorragies intra-rachidiennes* (1872); *Du sang et de ses altérations anatomiques* (1889); *Leçons de thérapeutique* (1887-93); *Leçons sur les maladies du sang* (1900); *Les évolutions pathologiques de la digestion stomacale* (1907); *Maladies de l'estomac* (1913).

HAYES, hāz, AUGUSTUS ALLEN (1806-82). An American chemist, born at Windsor, Vt. He graduated at the Norwich Military Academy in 1823 and began the study of chemistry under Professor Dana at Dartmouth. Here he distinguished himself by his researches on the proximate constituents of American medicinal plants and by his discovery of the organic alkaloid sanguinaria, a compound remarkable for the brilliant colors of its salts. He was for a time assistant professor of chemistry in the New Hampshire Medical College and while there in 1827 investigated the compounds of chromium, and his paper on this subject was highly praised by Berzelius. His contributions were published in the *Proceedings of the American Academy* and of the Boston Society of Natural History, the *American Journal of Science*, and the *Annual of Scientific Discovery*. In 1837 his investigations into the generation of steam and the economy of fuel led to the construction of improved furnaces and boilers.

HAYES, C(HARLES) WILLARD (1859-1916). An American geologist, born at Granville, Ohio. He graduated from Oberlin College in 1883, and, after a year as a high-school principal and further study, gained his Ph.D. at Johns Hopkins in 1887. He was connected with the United States Geological Survey from 1887 to 1911 (chief geologist, 1902-11), serving in 1898-99 also as geologist of the Nicaraguan Canal Commission. In 1911 he became first vice president and general manager of the Mexican petroleum company, El Aguila. He is known for his articles on theoretic and economic geology and on the geology of the southern Appalachians, and for his *Handbook for Field Geologists* (1912).

HAYES, DOREMUS ALMY (1863-). An American Methodist Episcopal theologian. Born at Russellville, Ohio, he graduated from Ohio Wesleyan University in 1884 and from Boston University School of Theology in 1887, in the latter also receiving the degree of Ph.D. from Boston University. He was professor of the Greek language and literature at the University of the Pacific from 1888 to 1891; was then for a year in Berlin and Leipzig as Jacob Sleeper fellow of Boston University School of Theology; in 1895-96 was professor of biblical theology in the Iliff School of Theology; and thereafter was professor in Garrett Biblical Institute—of the

English Bible (1896-1901) and then of New Testament exegesis. He contributed to various Bible encyclopædias and to religious periodicals and is author of *The Synoptic Problem* (1912); *The Most Beautiful Book Ever Written* (1913); *The Gift of Tongues* (1913).

HAYES, ISAAC ISRAEL (1832-81). An American Arctic explorer, born in Chester Co., Pa. He went with Captain Kane as surgeon on the second Grinnell expedition in search of Sir John Franklin (1853-55). Distinguishing himself by tracing by sledge journey the coast of Grinnell Land to Cape Frazer, 79° 43' N., Hayes differed with Kane as to the advisability of abandoning the *Advance* and attempted unsuccessfully to reach Upernivik by a boat journey, returning to Kane in the winter of 1853. Upon his return to the United States Hayes was fired with a desire to verify his conviction of the existence of an open polar sea. Through the influence of several scientific societies he succeeded in obtaining financial support and set out from Boston in 1860, with two astronomers and but 12 other persons, on board the *United States*. Wintering in Foulke Fiord, near Littleton Island, on the west coast of Greenland, he made an heroic attempt to reach the polar ocean in the spring of 1861. His astronomical observations were incorrect, either as to latitude or as to longitude, and it is uncertain at what point he thought himself to be on the shores of an open polar sea. Greely has given cogent reasons for fixing on Cape Goode, 80° 11' N., as Hayes's farthest. From Cape Goode he would naturally look down on the large area of open water (from heavy tides) that occurs at the southern end of Kennedy Channel. The result of his explorations was to confirm him in the opinion, soon proved to be entirely erroneous, that an open route to the pole was practicable for steamships in summer from Cape Frazer. After his return Hayes was appointed from Pennsylvania as surgeon of volunteers, in which capacity he served until the end of the Civil War, being brevetted lieutenant colonel. Removing later to New York, he entered political life and served for five years as a member of the New York Assembly. He made a voyage to Greenland in 1869; published *An Arctic Boat Journey* (1860), *The Open Polar Sea* (1867), *Cast Away in the Cold* (1868), *The Land of Desolation* (1871); and was honored by medals from the Royal Geographical Society of London and the Société de Géographie de Paris.

HAYES, RUTHERFORD BIRCHARD (1822-93). The nineteenth President of the United States. He was born in Delaware, Ohio, Oct. 4, 1822. He was a descendant in the sixth generation of George Hayes, who left Scotland in 1680 and settled at Windsor, Conn. His grandfather, Rutherford Hayes, born in New Haven, Conn., in 1700, settled in Brattleboro, Vt. Here the father of the President, also named Rutherford, was born. Rutherford senior and his wife emigrated to Ohio in 1817, but the father died shortly before his son's birth. When the boy was 16 years old, he was sent to Kenyon College, where he graduated at the head of his class in 1842. He studied law for two years in the office of Thomas Sparrow, of Columbus, and subsequently spent two years (1843-45) in the Harvard Law School. In 1845 he was admitted to the bar at Marietta, Ohio, and soon afterward entered into practice at Fremont, the residence of his uncle Sardis Birchard, then a wealthy

banker. In 1849 he removed to Cincinnati, where he soon gained a remunerative practice and became prominent in his profession. In 1852 he married Miss Lucy W. Webb, daughter of Dr. James Webb, of Chillicothe, Ohio. He took an active part in the first Republican presidential campaign and from 1858 to 1861 served as city solicitor. In 1861, when the Civil War broke out, he enlisted for the whole war, and on June 7 was commissioned as major of the Twenty-third Ohio, of which W. S. Rosecrans was colonel. To the regiment was assigned the duty, at Clarksburg, W. Va., of protecting the Baltimore and Ohio Railroad and of defending the border from raids; and Major Hayes took a prominent part in various expeditions necessary for the defense of the position. He served for a time as judge advocate of the Department of Ohio, and in August, 1862, he was promoted to the colonelcy of the Seventy-ninth Ohio, but he preferred to remain, with the rank of lieutenant colonel, with the Twenty-third, which had been incorporated with Burnside's command in the Army of the Potomac. At South Mountain (q.v.) the Twenty-third, led by Hayes, was hotly engaged, more than 100 of Hayes's men falling dead or wounded, and he himself being wounded in the arm. There was a pause for reinforcements, when a dangerous flank movement of the enemy was discovered, and Hayes was again seen at the head of the regiment. He was finally carried, fainting with loss of blood, from the field. Upon his recovery he was promoted to the rank of colonel and rejoined his regiment near the falls of the Great Kanawha. There he remained until March 15, 1863, when his regiment was ordered to Charleston, W. Va. After this he led in several important expeditions, notably in that which he himself organized to dispute the retreat of Morgan (q.v.) and his band after their raid through Ohio. By a quick movement he cut off Morgan's retreat and forced him to surrender. In the famous raid upon the Virginia and Tennessee Railroad, in May, 1864, he led the principal assault upon the enemy's fortifications with admirable boldness and success. He took an honorable part in the attack on Lynchburg, June 18, covering the retreat of the Union forces under dangerous conditions with perfect success. In the campaign of the Shenandoah, under Sheridan (q.v.), his services were conspicuous and valiant. In the battle of Winchester especially he displayed great coolness and courage in the most trying circumstances. "For gallant and meritorious services in the battles of Winchester, Fisher's Hill, and Cedar Creek," he was after the last-named battle speedily promoted to the rank of brigadier general; and "for gallant and distinguished services during the campaign in West Virginia, and particularly at the battles of Fisher's Hill and Cedar Creek," he was, on March 13, 1865, brevetted major general.

His achievements in the war made his name popular in Ohio, and when the Republicans of the Second District felt the need of a strong candidate for Congress, he consented to accept the nomination, with the understanding that he would not take the seat unless the war should meantime be ended. When, after the close of the war, he entered Congress, he at once attracted attention by his ability. He was re-elected in 1866, but had served only his first term when the Republicans of Ohio, in 1867, nominated him as their candidate for Governor,

under the conviction that he was the one man whom they could hope to elect. He was chosen by a majority of 3000 and reelected in 1869 by a majority of 7518. He was elected for the third time in 1875, and while occupying the place was nominated by the Republican party as its candidate for President of the United States, William A. Wheeler being nominated for Vice President. The nominees of the Democratic party were Samuel J. Tilden and Thomas A. Hendricks. The contest was severe and close, and disputes arose as to the electoral votes of several States. After a period of great tension all the contested cases were decided in favor of Hayes by the Electoral Commission (q.v.), and, having a majority of one electoral vote (185 to 184), he was duly inaugurated on March 4, 1877. Aside from violent partisan disputes upon the questions adjudicated by the Electoral Commission, his administration was admitted by men of all parties to have been pure and honorable. An effort was made to reduce the evil of using appointments to office as rewards for partisan services, but this policy did not meet with hearty support among politicians. The President also failed to maintain close harmony with the party leaders in his attitude towards the "reconstructed" States, from which he aimed to withdraw the Federal troops, even against the vigorous demands of the radicals for a continuation of the military supervision. He was generally recognized as a pacificator at a time when conciliation was essential to peace. Upon all political questions save those above referred to he was in full harmony with the Republican party, and by his courageous and unflinching exercise of the veto power prevented the adoption of measures calculated to injure the credit of the country and hinder a return to specie payments. He also, by the interposition of the same power, prevented the repeal of the laws enacted by Congress, under the express authority of the Constitution, to guard the purity of national elections. After his retirement from public office President Hayes devoted himself as a private citizen to the support of philanthropy and education. He died at Fremont, Jan. 17, 1893. Consult Stoddard, . . . *Hayes*, . . . *Garfield*, and . . . *Arthur* (New York, 1889), and Gladden, *The Great Commoner of Ohio* (Columbus, 1893). For the circumstances of his election, see Haworth, *The Disputed Election of 1876* (Cleveland, 1906), which is somewhat biased, and Bigelow (ed.), *Letters and Literary Memorials of Samuel J. Tilden*, vol. ii (New York, 1908). There are also three campaign biographies: Howard, *Life, Public Services, and Select Speeches of Rutherford B. Hayes* (Cincinnati, 1876); Howells, *Life of R. B. Hayes* (New York, 1876); and Conwell, *Life and Public Services of Gov. . . . Hayes* (Philadelphia, 1876). For an account of the administration of Hayes, see UNITED STATES.

HAYEZ, *fr.* FRANCESCO (1791-1882). An Italian genre and historical painter, born in Venice. He studied under Maggiorotto at the Venice Academy and afterward at the Academy of Milan and under Palagi in Rome. In 1820 he was appointed professor at the Milan Academy and became head of the Romantic movement in Italian art. He is chiefly noted as a vigorous colorist. Among his best-known works are frescoes in the Vatican and the Venice Academy and the following pictures: "The Two Foscari," Vienna Museum; "Peter the Hermit"; "The

Farewells of Pietro Rossi and his Family" (1820); "The Flight of Bianca Capello" (1854), National Gallery, Berlin; "The Battle of Magenta," and a portrait of Cavour.

HAY FEVER, **HAY ASTHMA**, **HAY COLD**, **ROSE COLD**, or **AUTUMNAL CATARRH**. A nervous affection which recurs annually at about the same time of the year and lasts several weeks, characterized by a profuse flow of secretion from the nose, as well as of tears from the eyes, with frequent sneezing, general malaise, irritability, insomnia, depression, and in many cases asthma. The eyes flinch in bright light, headache occurs daily, appetite is lessened, and rarely there is fever. In some patients the attack appears in June and lasts about a fortnight. This is termed rose cold. Many suffer first in July, during haying; but probably the greater number begin to suffer early in August and are relieved only on the approach of frost in October. The cause appears to be threefold: 1. A central nervous disease, with the lesion probably in the floor of the fourth ventricle in the brain, as in spasmodic asthma. 2. Intranasal deformity, as a deviating septum, or distorted and chafing turbinates. 3. A special pollen of some plants, affecting some and failing to excite others; while during the whole year fine dust causes in these patients sneezing, coryza, and slight rhinitis, lasting an hour or so. Removal to the seashore or a sea voyage benefits many patients; while a sojourn in the mountains at an altitude of 1000 feet or more benefits a large number. Of the mountains in the eastern part of the United States the White Mountains have the greatest reputation with regard to the effect of their atmosphere upon hay-fever patients. On returning home before frost, however, the affection recurs. It is said that most hay-fever patients are people of considerable intellectual development; certainly many are neurotics. Arsenic, iodides, and bromides benefit some. Nasal sprays and internal administration of extract of suprarenal gland (adrenalin, q.v.) are serviceable in many cases, relieving the nasal stenosis. In England and on the Continent the disease appears to be of milder type and to run a course of only a month. Dunbar's pollantin, an antitoxin obtained from animals into which pollen of rye and other grasses had been injected, was used in 1894 by Berlin experimenters who reported 57 per cent of cures, 32 per cent of improvement in the early variety of the disease, 70 per cent of cures, and 19 per cent of improvement in the fall variety. Pollantin is applied in the form of serum, powder, or ointment—generally to the eyes, sometimes to the nose. American clinicians do not obtain such a high percentage of cures as those reported by the Berlin investigators. Many sufferers are cured or greatly relieved by surgical correction of diseased conditions in the nose.

HAYFORD, JOHN FILLMORE (1868-). An American civil engineer. He was born at Rouse's Point, N. Y., and graduated as a civil engineer from Cornell University in 1889. Until 1909 he served (periodically) with the United States Coast and Geodetic Survey in various capacities, becoming expert computer and geodesist in 1898, and in 1900 inspector of the geodetic work and chief of the computing division. He was assistant astronomer of the International Boundary Commission of the United States and Mexico in 1892-93, taught civil engineering at Cornell in 1895-98, and in 1909 became director of the College of Engineering of Northwestern

University. Besides monographs, he is author of *A Text Book of Geodetic Astronomy* (1898).

HAY'GOOD, ATTICUS GREEN (1839-96). An American clergyman of the Methodist Episcopal Church South, born in Watkinsville, Ga. He graduated at Emory College, Georgia, in 1859, and soon afterward entered the ministry. Between 1870 and 1875 he edited the Sunday-school publications of the Southern branch of the church. He was president of Emory College from 1876 to 1884 and from 1878 to 1882 was editor of the *Wesleyan Christian Advocate*. Large sums of money were placed in his hands to promote various institutions, and in 1883 he was elected general agent of the Slater fund of \$1,000,000 for the education of Southern negroes. He declined an election as Bishop of the Methodist Episcopal Church South in 1882, but accepted another election in 1890. His works include: *Our Children* (1876); *Our Brother in Black* (1881); *Speeches and Sermons* (1884); *Pleas for Progress* (1889); *Jackknife and Brambles* (1893); *The Monk and the Prince* (1895).

HAY'LEY, WILLIAM (1745-1820). An English poet, born at Chichester. He was educated at Eton and at Trinity College, Cambridge. After some ill success as a playwright, he began the production of poetical epistles to his friends—one on *Painting* to Romney (c.1777), e.g., and one on *History* (1780) to Gibbon. In *English Bards and Scotch Reviewers* Byron impales Hayley as the author of the eminently successful poems, *The Triumphs of Temper* (1781) and *The Triumphs of Music* (1804). His prose *Life of Milton* (1794) was a more creditable performance, and through the writing of it he became an intimate friend of Cowper, for whom he was influential in obtaining a pension. Blake's illustrations enhance the value of his *Ballads Founded on Anecdotes of Animals* (1805), and on the whole Hayley is more interesting as the friend of great men than on his own account. His volume of *Memoirs*, published in 1823, is his most important contribution to literature.

HAYM, him, RUDOLF (1821-1901). A German writer on philosophy and literary history, born at Grünberg in Silesia. He studied at the universities of Halle and Berlin and was a delegate to the National Assembly at Frankfort (1848-49). From 1858 to 1864 he edited the *Preussischen Jahrbücher*. In 1851 he became instructor in philosophy and modern literature at the University of Halle, in 1860 he was made assistant professor and in 1868 professor. He wrote a number of excellent biographies, among them: *W. von Humboldt* (1856); *Hegel und seine Zeit* (1857); *Arthur Schopenhauer* (1864); *Herder, sein Leben und seinen Werken dargestellt* (1877-85); *Das Leben Max Dünklers* (1890). He also published *Die romantische Schule* (1870), *Erinnerungen aus meinem Leben* (1901); and edited *Briefe von W. von Humboldt an G. H. L. Nicolovius* (1894). Consult *Philosophische Abhandlungen dem Andenken Rudolf Hayms gewidmet von Freunden und Schülern* (1902).

HAY'MAR'KET, THE. A former market for hay and straw in London, founded in the first half of the seventeenth century and discontinued in 1830. On the square of the same name, occupying the site of the market, stand the Haymarket and His Majesty's theatres. Addison wrote *The Campaign* while living there.

HAYMARKET SQUARE RIOT, THE. An

occurrence at Chicago, May 4, 1886, in a square in Randolph Street, where an anarchist meeting was in progress. The attempt to disperse the gathering resulted in the killing of seven policemen and the wounding of 27 others, by a bomb, thrown by an unidentified member of the mob, supposed to have been one Schnaubelt. The actual bomb thrower was never caught, but August Spies, Adolph Fischer, George Engel, and Albert Parsons were hanged as accomplices on Nov. 11, 1887; Samuel Fielden and Michael Schwab were sentenced to imprisonment for life, and Oscar Neebe for 15 years (all three pardoned by Gov. John P. Altgeld, q.v.); and Louis Ling escaped the gallows only by committing suicide in prison.

HAYMARKET THEATRE. One of the most famous playhouses in London. It was originally built in 1720 by John Potter, on the site of the King's Head Tavern, in the Haymarket, and leased to a French company, whence the appellation, the New French Theatre, by which it was for some time known. Fielding produced his burlesque *Tom Thumb the Great* there in 1730 and in 1734 became manager. Ten years later Charles Machlin assumed its management and was followed in 1747 by Samuel Foote. In 1776, however, Colman the Elder purchased it, and it was managed by him until 1794. In 1820, under Harris's management, the theatre was abandoned, and a new one was built near by, which was opened on July 4, 1821, with *The Rivals*. In 1880 it was again removed, its present site being the south end of the Haymarket, opposite Charles Street. Consult Cyril Maude, *The Haymarket Theatre: Some Records and Reminiscences* (London, 1903), and H. B. Baker, *History of the London Stage* (New York, 1904).

HAYMERLE, hi'mér-le, HEINRICH KARL, BARON (1828-81). An Austrian statesman, born and educated at Vienna. He took part in the students' rising in the revolution of 1848 and narrowly escaped execution. He served in the diplomatic corps at Athens, Dresden, and Frankfort as Secretary of Legation; became Ambassador to Copenhagen in 1864, took part in negotiating the Treaty of Prague (1866), and from Berlin went to Constantinople (1868) and to Athens (1869), thence to The Hague (1872), and in 1877 to the Italian court. In the following year he took part in the Berlin Congress and in 1879 succeeded Andrassy as Minister of Foreign Affairs. In this post, which he held till his death, he was especially active in effecting friendly relations with Italy and cementing the alliance with Germany. Consult Arneht, *Heinrich Freiherr von Haymerle* (2d ed., Berlin, 1882).

HAYMO. See **HAIMO**.

HAYNAU, hi'nou, JULIUS JAKOB, BARON (1786-1853). An Austrian general. He was the natural son of the Elector William I of Hesse and was born at Cassel, Oct. 14, 1786. He entered the Austrian service in 1801 and served throughout the Napoleonic wars, being wounded at Wagram. He was gradually advanced in rank, becoming colonel in 1830, major general in 1835, and field marshal lieutenant in 1844. During the Italian campaigns of 1848-49 he evinced great military talents, but acquired also an unenviable reputation for cruelty, especially in the repression of the insurrection at Brescia, March 31 and April 1, 1849. Haynau was engaged in the siege of Venice, when he was summoned to Hungary to command the Imperial

forces in that country. On August 9 he gained a decisive victory over the Hungarians near Temesvár. After the surrender of the Hungarian main army at Világos he executed a number of the leading Hungarian generals. In 1850, however, after being loaded with honors, he was dismissed from public service for the intractability of his disposition. In the same year he made a tour of Europe, but so general was the hatred his acts had inspired that he was several times in great danger from mobs, and while in London was assaulted and beaten by the infuriated draymen of Barclay's brewery. For this insult the British government declined giving any satisfaction. In Belgium and France he was also received by the populace with strong dislike, but the vigilance of the authorities preserved him from actual harm. He died at Vienna, March 14, 1853. Consult *Schönhals, Biographie des Feldzeugmeisters Julius Freiherrn von Haynau* (3d ed., Vienna, 1875), which seeks to vindicate him from charges of cruelty.

HAYNE, hān, PAUL HAMILTON (1831-86). An American poet, born in Charleston, S. C. After the death of his parents he was reared by his uncle, Robert Y. Hayne (q.v.). He studied law after having been educated at South Carolina College, but did little practicing because he was under no financial necessities and because his bent was literary. When in his early twenties he edited *Russell's Magazine* and was connected, as editor or contributor, with other Charleston and Southern publications, notably as contributor to the *Southern Literary Messenger*. He was a prominent member of the small literary coterie of which William Gilmore Simms and Henry Timrod (q.v.) were conspicuous ornaments. In 1855 a volume of his poems appeared; another followed in 1857, and a third in 1859. During the Civil War he saw active service and suffered great financial losses—among others that of his library, which was burned. From 1865 to his death he resided at a small cottage home near Augusta, Ga., which he called Copse Hill. His health was not good, but he maintained his spirits under his various misfortunes and won a genuine though limited reputation as a poet in both the North and his native section. His memory is still cherished warmly in Augusta and the surrounding region. His later publications include: *Legends and Lyrics* (1872); *The Mountain of the Lovers* (1873); and his complete *Poetical Works* (1882). He also edited, with a memoir (1873), the poems of his friend, Henry Timrod, and of Dr. F. O. Ticknor (1879), and wrote memoirs of R. Y. Hayne and H. S. Legaré (1878). Hayne's poetry is the work of a genuine artist, whose qualities, however, are not salient enough to attract greatly the general reader. Although he produced many good poems, in which much of the langorous sweetness of the South may be discovered, it was not his fortune to compose, like his friend Henry Timrod, lyrics of great power and popular appeal. Nevertheless he is one of the most important of Southern writers and deserves more attention at the hands of historians of American literature than he has hitherto received.—His son, WILLIAM H. HAYNE (1856-), born in Charleston, inherited some of his father's poetical ability. His publications include *Sylvan Lyrics* (1893) and many occasional verses in the magazines.

HAYNE, ROBERT YOUNG (1791-1839). An American political leader, prominent as an exponent of the States' Rights view of the Fed-

eral Constitution. He was born in St. Paul's Parish, Colleton District, S. C., on Nov. 10, 1791, was educated in a private school at Charleston, studied law in the offices of Langdon Cheves (q.v.), was admitted to the bar at Charleston in November, 1812, and attained immediate prominence in his profession. During part of the War of 1812 he acted as a captain in the Third South Carolina Regiment. From 1814 to 1818 he was a Democratic-Republican member of the State Legislature, serving as Speaker of the House in the latter year, and from 1818 to 1822 was Attorney-General of the State. In 1823 he was elected as a States' Rights Democrat to the United States Senate, in which body he quickly became conspicuous as a pronounced strict-constructionist and an advocate of free trade and of States' Rights. He vigorously opposed the tariffs of 1824 and 1828, denounced the antislavery programme of the Panama Congress, and in various debates upheld the view that slavery was purely a domestic institution, and as such should be wholly exempt from Federal legislation or interference. He is best known, however, for his great debate with Daniel Webster in January, 1830, arising out of the so-called Foote's Resolution, but covering the important question of the relation of the States to the Federal government. Hayne began the debate on January 19, and Webster answered on the following day, while Hayne again spoke on the 21st, 25th, and 27th, and Webster on the 26th and 27th. In these speeches, besides attacking New England, and especially Massachusetts, for the part taken by that section in the War of 1812, he brilliantly upheld the theory that the Federal government was in reality a compact between the various States, as such; that the Federal government itself was a party with each of the individual States to the compact thus formed, and that any State, when convinced that that compact had been broken, could for its own protection nullify or arrest the enforcement within her borders of any law deemed to be in violation of the Constitution. He naturally supported South Carolina in her controversy with the Federal government over the tariff measures of May, 1828, and July, 1832; was a member of the Nullification Convention which assembled at Charleston on Nov. 19, 1832; and as chairman of the Committee of Twenty-one, reported the famous Ordinance of Nullification, which was passed by the convention on November 24. Soon afterward he resigned from the Senate, partly, no doubt, in order that Calhoun might take his seat in that body; and in December he was elected Governor of the State and commander in chief of the State forces. On the 13th he delivered his inaugural address, pledging himself to maintain at all hazards the principle of nullification, and on the 20th issued a ringing counterproclamation to the famous proclamation issued by President Jackson on the 10th. During the whole crisis he administered the executive office with marked ability, and though firmly convinced of the correctness of the position taken by his State, he used his influence on several occasions to restrain the nullificationists from acts of violence. His term as Governor ended in December, 1834. He was mayor (intendant) of Charleston in 1835-37, and president of the Louisville, Cincinnati, and Charleston Railroad from 1836 until his death. He died at Asheville, N. C., Sept. 24, 1839. Consult: Paul H. Hayne, *Lives of Robert Y. Hayne and Hugh Swinton Legaré* (Charleston

1878); McDuffie, *Eulogy upon the Life and Character of the Late Robert Y. Hayne* (ib., 1840); Lindsay Swift (ed.), *The Great Debate Between Robert Y. Hayne, of South Carolina, and Daniel Webster, of Massachusetts* (Boston, 1898), in the "Riverside Literature Series"; Jervay, *Robert Y. Hayne and his Times* (New York, 1909).

HAYNES, HÄNZ, ELWOOD (1857—). An American inventor. Born at Portland, Ind., he graduated from Worcester Polytechnic Institute in 1881, and after study at Johns Hopkins University (1884-85), taught sciences for a year. He was manager of the Portland Natural Gas and Oil Company until 1890 and then field superintendent of the Indiana Natural Gas and Oil Company until 1901. In 1898 he became president of the Haynes Automobile Company. In 1893-94 he constructed a horseless carriage, now exhibited at the Smithsonian Institution. He found several metallic alloys useful in connection with the manufacture of automobiles.

HAYNES, HENRY WILLIAMSON (1831-1912). An American archaeologist, born in Bangor, Me., son of Nathaniel Haynes, editor of the *Eastern Republican*. He graduated at Harvard in 1851, studied law, and practiced for a few years. Then he was appointed professor of Latin and later of Greek in the University of Vermont, a chair from which he resigned in 1873 to make archaeological researches in Europe and in Egypt. His memoirs on the Paleolithic Age in Egypt (1878) won him a medal and a diploma from the Anthropological Congress of that year in Paris and afterward were published in the papers of the American Academy of Arts and Sciences. Haynes was long a fellow of the American Association for the Advancement of Science, and recording secretary of the Massachusetts Historical Society.

HAYNES, JOHN (?-1654). An English Colonial Governor in New England. He was born in Essex, but emigrated to Newe Towne (now Cambridge), Mass., with other Puritans in 1633. He was Governor of Massachusetts in 1635-36 and then became one of the settlers of Hartford, Conn. In 1639 he was chosen Governor of Connecticut (of whose constitution he was one of the five framers), and to this office he was re-elected as often as the law permitted—i.e., each alternate year until his death—serving in five of the alternate years as Deputy Governor. In Bancroft's *History of the United States*, vol. i, he is described as being "of a very large estate and large affections; of a heavenly mind and a spotless life; of rare sagacity and accurate but unassuming judgment; by nature tolerant, ever a friend of freedom."

HAYNES, JOHN HENRY (?-1910). An American archaeologist, born at Rowe, Mass. He graduated from Williams College in 1876 and taught school for several years in Massachusetts. An expedition to Crete made with W. J. Stillman, aroused his interest in archaeology. He went with the American expedition to Assos, tutored at Robert College, Constantinople, for three years, was manager of the Wolfe expedition to Babylonia in 1884, and then was teacher and treasurer at the Central Turkey College at Amlat until 1888. He accompanied two expeditions to Babylonia and had charge of two more in 1892 and 1898, under the auspices of the University of Pennsylvania, and in the intervals served as United States Consul at Bagdad. His discoveries were of importance.

HAYNES, JOSEPH. See HAINES.

HAY-PAUNCEFOTE (hä'pans'fyt) **TREATY.** The convention negotiated in 1901 by John Hay, Secretary of State, on the part of the United States, and Lord Pauncefote, the British Ambassador at Washington, on the part of Great Britain, which abrogated the Clayton-Bulwer Treaty (q.v.) and defined the policy which should govern the United States in the construction and maintenance of an Isthmian canal between the Atlantic and Pacific oceans. The Clayton-Bulwer Treaty was extremely unpopular in the United States, owing to its provision that any canal which should be constructed to connect the Atlantic and Pacific oceans should be the work of both nations and should be under their joint control. The statement in President McKinley's annual message to Congress in 1898, that the construction of the canal had become a national necessity, led to diplomatic correspondence that resulted finally in the opening of negotiations, with the end in view of so modifying the Clayton-Bulwer Treaty that, without affecting the general policy of neutrality enunciated therein, the United States would be enabled to proceed alone with the construction of the canal and have the sole right of control over it. The treaty then negotiated, and transmitted to the United States Senate by President McKinley on Feb. 5, 1900, provided: (1) for the construction of the canal by or under the auspices of the United States government; (2) for its neutralization on the same basis as the Suez Canal; and (3) for an invitation to other powers to join in guaranteeing such neutrality. The convention was finally ratified by the Senate on Dec. 20, 1900; but with three amendments—the first of which provided that the restrictions contained in the second article, based on the Suez convention, should not apply to such measures as the United States might find it necessary to take for their own defense and the maintenance of public order; the second explicitly stated that the Clayton-Bulwer Treaty was thereby abrogated; and the third struck out the provision in regard to the guarantee to be asked of other nonconstructing powers. In its amended shape Great Britain refused to ratify the convention, and it expired by limitation on March 5, 1901. Negotiations for a new treaty were immediately started, however, by Secretary of State Hay and Lord Pauncefote; the new convention was signed by them on Nov. 18, 1901, transmitted to the Senate by President Roosevelt on December 5 following, and ratified by that body, with but slight opposition, 11 days later. The principal differences between the first and final treaties were three in number: (1) no guarantees of the canal's neutrality were to be asked either of Great Britain or any other power; (2) the Clayton-Bulwer Treaty was specifically abrogated, although the general principle of neutrality contained therein was retained; (3) certain undefined rights of control were to be allowed to the United States in time of war, the exact nature and extent of which were not specified, but there was no requirement that the canal should be kept open and free in time of war as in time of peace, nor was there a prohibition of the erection of fortifications commanding the canal or its adjacent waters. It was further provided that the canal to be constructed should be open to the ships of all nations on equal terms, and that no change in the sovereignty of the territory traversed by the

canal should alter the principle of neutrality and of equal rights of all nations to enjoy the benefits of the canal. The completion of the canal over the Isthmus of Panama and the enactment by Congress of the Panama Canal Act in 1911, providing for the exemption of American vessels engaged in domestic commerce from the tolls imposed on other vessels, raised the last-mentioned provision into prominence and excited great controversy. The government of Great Britain formally protested against the exemption of domestic American shipping on the ground that it constitutes a clear violation of the provision of the treaty which guarantees equal treatment of the shipping of all nations using the canal, and suggested the reference of the controversy to arbitration. On the other side it was contended (1) that the clause forbidding discrimination among the users of the canal had no reference to domestic but only to foreign commerce; (2) that the provision was intended to confer equal privileges only on foreign nations as between themselves and not to limit the power of the United States to regulate its commerce, foreign and domestic, in its own interest; and (3) that the acquisition of the Canal Zone by the United States was such a change of conditions existing at the time the treaty was made or contemplated by those who framed it as to render the restrictive provisions null and void. It was also urged by the large and aggressive party opposing the claims of Great Britain that the treaty is so clearly at variance with the fundamental interests of the United States as to demand its immediate abrogation. No action was taken on the request of Great Britain that the question at issue be submitted to arbitration, but, President Wilson having taken the view that the national honor and the best interests of the country call for the strict observance of the treaty in its spirit as well as its letter, Congress, on his recommendation, but in the face of strong opposition, passed a bill repealing the obnoxious provisions of the Panama Canal Act (1914). Notwithstanding this victory for the treaty, it cannot be said that it is popular in the United States. Much of the irritation with the Clayton-Bulwer Treaty, which resulted in its abrogation, has been transferred to its successor. It is widely regarded as an undue interference with the freedom of action of a sovereign nation—the Panama Canal strip having come to be popularly regarded as a part of the territory of the United States. Consult L. Nixon, *Canal Tolls and American Shipping* (New York, 1914).

HAY RIVER. A river at Alberta, Canada, which rises in the Rocky Mountains in British Columbia, and flows northeast, emptying into the Great Slave Lake (Map: Canada, G 5). Its length is 350 miles, of which 140 are navigable. The two Alexandra Falls, averaging 900 feet wide and about 250 feet high, occur in its course.

HAYS. A city and the county seat of Ellis Co., Kans., 222 miles by rail west of Topeka, on Big Creek, and on the Union Pacific Railroad (Map: Kansas, C 5). It has grain elevators, flour mills, machine shops, etc., and a trade in flour, grain, and live stock. Hays is the seat of the western branch of the State normal school and of an agricultural experiment station, comprising some 2000 acres, of the State Agricultural College. The water works are owned by the city. Pop., 1900, 1136; 1910, 1961.

HAYS, CHARLES MELVILLE (1856–1912). An American railroad official, born at Rock Island, Ill. He was connected with the Atlantic and Pacific Railroad until 1877, then with the Missouri Pacific until 1884, and with the Wabash, St. Louis, and Pacific, of which he became assistant general manager in 1886. Later he served as general manager of the Consolidated Wabash System, and as general manager of the Grand Trunk Railway (1895–1901). For part of a year he was president of the Southern Pacific, returning to the Grand Trunk to be second vice president and general manager. In 1910 he was elected president of the Grand Trunk Railway and all its subsidiary lines. He was one of the victims of the *Titanic* disaster.

HAYS, FRANCIS (1865–). An English temperance advocate, born in Liverpool. He gave up the study of law on Cardinal Manning's suggestion to enter the Catholic priesthood, to which he was ordained in 1894. In 1896 he founded the World's Catholic Temperance Crusade and preached this crusade in nearly every part of the English-speaking world with much success. Leo XIII gave him the title "The Apostle of Temperance."

HAYS, ISAAC (1796–1879). An American physician, born in Philadelphia. He graduated at the University of Pennsylvania in 1816, studied medicine there for four years, and subsequently devoted himself largely to editorial work on medical journals. He was sole editor from 1827 to 1869 of the *American Journal of the Medical Sciences*, was the founder of the *Medical News* in 1843 and of the *Monthly Abstract of Medical Science* in 1879, was president of the Academy of Natural Sciences in Philadelphia from 1865 to 1869, and was an active member of the Philosophical Society. He was also one of the founders of the Franklin Institute, was its secretary for several years, and at the time of his death was its oldest member. He was one of the oldest members, and for a time an officer, of the College of Physicians of Philadelphia; also one of the founders of the American Medical Association, and author of its code of ethics, which has been adopted by all the medical societies in the country. He edited several important works on medicine.

HAYS, WILLIAM JACOB (1830–75). An American animal painter, born in New York. In order to paint animals he visited Nova Scotia and the upper waters of the Missouri. Some of his pictures are of historic interest—such as "The Herd in the Moor" (a herd of buffaloes); "The Prairie-Dog Village"; "A Bison Bull at Bay"; "Prairie on Fire"; "Herd of Caribou in Nova Scotia." His work is fresh and spirited, but deficient in color.

HAYS, WILLIAM SHAKESPEARE (1837–1907). An American journalist, ballad writer, and composer. He was born at Louisville, Ky., became a reporter for the Louisville *Democrat* in 1857, and as "river editor" for the Louisville *Courier-Journal* was active in the movement for the betterment of the Ohio and Mississippi waterways. He served also as clerk and captain on river steamboats for four years. Under the name "Will S. Hays" he gained a national reputation as the author of popular ballads—his "Mollie Darling" had an estimated sale of 2,000,000 copies. Hays always insisted that he wrote the original words and composed the air of "Dixie." Among his better-known songs are: "Keep in de Middle ob de Road," "The Little Old Log

Cabin in the Lane," "Write me a Letter from Home," "Nora O'Neil," and "Shamus O'Brien."

HAYTER, SIR GEORGE (1792-1871). An English historical and portrait painter. He was born in London and was the pupil of his father, Charles Hayter, a popular drawing master and teacher of perspective, and of the Royal Academy. After some years spent at sea, he took up miniature painting and was named miniature painter to the Princess Charlotte. He then studied at Rome, where he was honored by membership in the Academy of St. Luke, and, returning to London, became a successful portrait painter. On Victoria's accession he was appointed painter to the Queen, and was knighted in 1842. Among his best-known works are: "Trial of Queen Caroline," with 189 likenesses; "First Reformed Parliament," National Portrait Gallery; "Coronation of Queen Victoria"; "Marriage of Queen Victoria," Windsor Castle—all official pictures. He is best represented in the National Portrait Gallery, London. Modern critics find it difficult to share the former appreciation of his work, which is detailed and spiritless in execution and poor in color.

HAYTI, ha'ti. See **HAITI**.

HAYWARD. A town in Alameda Co., Cal., 22 miles southeast of San Francisco, on the southern Pacific and the Western Pacific railroads (Map: California, C 5). It contains a public library, high school, and two fine boulevards. Situated in an agricultural and fruit-growing country, Hayward has canning factories, pickle works, etc. Pop., 1900, 1905; 1910, 2746.

HAYWARD. A town and the county seat of Sawyer Co., Wis., 58 miles by rail southwest of Ashland, on the Namakagon River, and on the Chicago, St. Paul, Minneapolis, and Omaha Railroad (Map: Wisconsin, B 2). It has a Carnegie library, a \$20,000 county jail, and a United States government Indian school. Agriculture is the most important industry, and there are a creamery, a pickle factory, and a flour and feed mill. The water works are owned by the town. Pop., 1900, 2720; 1910, 2869.

HAYWARD (AS. *hæigweard*, from *haga*, OHG. *hag*, Ger. *Hag*, Eng. *haw*, hedge + *weard*, OHG. *wart*, Ger. *Wart*, guard). The name originally given in England to one who kept the common herd of cattle of a town, or of a manor, when the copyhold or other tenants had the right of sending cattle to graze. In the New England villages, particularly of Massachusetts, the name "hayward" was given to the keeper of the pound for strayed horses and cattle. The word is not now in general use in the United States.

HAYWARD, ABRAHAM (1801-84). An English essayist, born at Wilton, near Salisbury. He received his education at home with a tutor and afterward in the fine library of the solicitor to whom he was articled. While a student at the Inner Temple, London, he attracted attention as the joint editor of a law magazine and also as a debater in the same club with J. S. Mill, whom he wrote against in later years. As a result of two German sojourns, Hayward made an acceptable translation of Goethe's *Faust* (1833), of which a second and enlarged edition was published the following year, and he was thus introduced into the society of such men of letters as Lockhart, Macaulay, and Sydney Smith. He wrote, notably, a book upon *The Art of Dining* (1852); *Sketches of Eminent Statesmen and Writers* (1880); numerous essays and papers,

topical and other; and he did considerable editorial work, Mrs. Piozzi's *Autobiography* (1861) and *Diaries of A Lady of Quality from 1797 to 1844* (1864) being conspicuous in this field. He left the Tory party for the Whigs in 1846, but, not receiving from them the preferment he considered his due, he took revenge upon his enemies with tongue and pen. However, he had many warm friends and was a noted club man, whist player, and contributor of biographical and political essays to the leading reviews.

HAYWARD, SIR JOHN (c.1564-1627). An English historian. He was born and educated at or near Felixstowe, Suffolk, and graduated at Cambridge. His earliest production, *The First Part of the Life and Raigne of Henry the III, Extending to the End of the First Yeare of his Raigne* (1599), placed him in the bad graces of Queen Elizabeth, who was easily persuaded that he was pointing a moral for herself in his account of Richard II's downfall and therefore had the historian imprisoned. Having learned policy, Hayward kept the favor of James I, dedicated books to him and his son, defended the divine right of kings, and advocated the union of England and Scotland. Among his works are: *An Answer to the First Part of a Certain Conference Concerning Succession* (1603); *The Lives of III Normans, Kings of England* (1613); *The Sanctuarie of a Troubled Soule* (1616); *David's Teares* (1622-23); *Christ's Prayer Upon the Crosse for His Enemies* (1623); *Of Supremacie in Affaires of Religion* (1624-25); and *The Life and Raigne of King Edward the Sixth* (1630), published after the author's death.

HAYWOOD, ELIZA (c.1693-1756). An English novelist and dramatist, born probably in London. Her maiden name was Fowler. She married when she was young, was deserted by her husband, and about 1715 appeared in Dublin and London as an actress. Steele's *Sappho*, in the *Tatler* of April 23, 1709, is usually identified with her, but wrongly it would seem from the dates. She rewrote *The Fair Captive* (1721); composed a comedy, *A Wife to be Lett* (1723), in which she acted, and a tragedy, *Frederick, Duke of Brunswick-Lunenburgh* (1729); and collaborated with Hatchett in *Opera of Operas* (1733). But she is best known for her novels which brought upon her an attack by Pope in the *Dunciad* (book ii, 157 et seq.). Mrs. Haywood and Curll replied with a *Female Dunciad* (1729). A collected edition of her novels, not including the famous *Memoirs of a Certain Island* (1725) and *The Secret History of the Present Intrigues of the Court of Caramania* (1727), appeared in 1724.

HAYWOOD, WILLIAM D. (?-). An American labor agitator. He first attracted notice by his leadership of the Western Federation of Miners, of which he was secretary, during the Cripple Creek strikes of 1904. When ex-Governor Frank Steunenberg was murdered in 1905, Haywood, with others, was implicated by the confession of the assassin, Harry Orchard; but he was acquitted two years later. He became a member of the executive committee of the Industrial Workers of the World, and as a leader of that organization conducted the Lawrence (Mass.) textile strike in 1912 and the strike in the Paterson (N. J.) silk mills in 1913. In the latter year his advocacy of sabotage and contempt for political action by the Socialist party cost him his membership in the National Executive Committee of that organization. He

is coauthor with Frank Bohn of *Industrial Socialism* (1911).

HAY WORM. A lepidopterous larva (*Astopia costalis*), peculiar to North America, which has the strange habit of feeding normally upon dried hay, especially clover hay, but also upon timothy and alfalfa. In large numbers it attacks the hay, both in the mow and in the stack, cutting the leaves up into chaffy pieces and webbing them together with silken threads. The hay looks moldy, is infested with excremental pellets, and is distasteful to cattle. The larva is dirty white in color and grows to a length of about three-fourths of an inch. The adult moth is lilac brown or purple, with two bands of a lighter shade on each fore wing. Old mows should be thoroughly cleaned out before putting new hay in a barn, and infested stacks should be burned.

HAYYUJ, JUDAH BEN DAVID (c.950–c.1000). A Jewish grammarian. He was born at Fez, near the middle of the tenth century, went to Cordova, and became a pupil of the grammarian Menahem ben Saruk. His theory that all Hebrew roots contain three letters was an important contribution at the time to Hebrew philology and lexicography. He died in the beginning of the eleventh century. His two important grammatical works are *The Book of Verbs with Weak Letters* and *The Book of Verbs Containing Doubled Letters*, which are intended to illustrate his theory. In addition, he prepared a monograph on *Punctuation*, setting forth the features of the Hebrew vowel system. Of a fourth grammatical work only fragments have been found. Consult Jastrow's edition of Hayyuj's treatises on *Weak and Gemmative Verbs in Hebrew* (Leyden, 1897).

HAZARAS, hà-zá'ráz. A semi-independent and partially nomadic people, of Mongolian ancestry, in the region between Herat and Kabul, Afghanistan, into which country they are said to have come, in the fourteenth century, in the wake of the great Mongolian movement of Genghis Khan. They profess Islam, the Hazaras proper to the east being Shiites, the western Hazaras, or Aimak (i.e., horde), as they are sometimes called, Sunnites. Their language has been not a little influenced by Persian.

HAZARD (OF. *hasard*, *hasard*, Fr. *hasard*, from Sp. *azar*, unlucky throw of dice, misfortune, ace of dice, from Ar. *al*, the + *zár*, from Pers. *zár*, die). A game of dice, formerly very popular in England, where it is played both for amusement and for purposes of gambling. In the latter respect, however, a frequent player, by his knowledge of the peculiarities of the game, has the beginner at a considerable disadvantage. The game is played with two dice. The "main," which is called by the "caster," may be either 5, 6, 7, 8, or 9. Should he (the caster) throw the number called, he is said to "nick," and thus defeats his opponent, who is styled the "setter."

HAZARD, CAROLINE (1856–). An American educator, born at Peacedale, R. I. She was educated privately in the United States and abroad, contributed reviews, essays, and verse to magazines, published several volumes, and from 1899 to 1911 was president of Wellesley College (Massachusetts). Her works include: *Narragansett Ballads* (1894); *The Narragansett Friends' Meeting* (1899); *Some Ideals in the Education of Women* (1900); *A Scallop Shell of Quiet* (1908); *A Brief Pilgrimage in the Holy Land* (1909); *The College Year* (1910).

HAZARD, á'zár', DESIRÉ. A nom de plume of Octave Feuillet (q.v.).

HAZARD, EBENEZER (1744–1817). An American author, born in Philadelphia and educated at Princeton. He went into the publishing business in New York in 1770, but left it five years later for a government position and from 1782 to 1789 was Postmaster-General. In 1791 he was once more in business—this time in Philadelphia, where he helped to establish the North American Insurance Company. Besides giving literary assistance in the compilation of two histories and a biblical translation, he published *Historical Collections* (2 vols., 1792–94), and a few years later *Remarks on a Report Concerning Western Indians*, evincing, among other things, his solicitude for the spiritual welfare of the red man. But his most valuable literary remains are the letters in the possession of the Massachusetts Historical Society.

HAZARD, ROWLAND GIBSON (1801–88). An American manufacturer and author. He accumulated a fortune in the woolen business at Peacedale, R. I., and was for three terms a member of the State Legislature. Among his writings are essays on *Language: Its Connection with the Constitution and Prospects of Man* (1836), on *The Resources of the United States* (1864); and two letters addressed to John Stuart Mill, on *Causation and Freedom in Willing* (1869).

HAZE. Any comparatively slight obscuration of distinct vision due to the opacity of any medium, such as the atmosphere, through which the object is seen. The thickest haze in the atmosphere obscures the light of the sun to such an extent that his disk is but just distinguishable from the surrounding background; any greater obscuration than this is usually spoken of as cloud. This hazy effect may be produced in several ways: 1. When the air is filled with small masses of very different densities, such as rising currents of hot air and descending currents of cold air over a heated soil. In this case the beam of light is by refraction broken up and diffused so that a hazy effect, or even complete opacity, may be produced, as in a mixture of air bubbles and water. Such a mixture is also partly opaque to sound. The haze thus produced is ordinarily spoken of as *heat haze*. 2. The ordinary hazy effect in the atmosphere produced by the presence of foreign particles, either solid or liquid. Minute particles of ice or water form an *aqueous haze*; all other material is included under the term *dust haze*. The dust is raised from the ground by strong wind, by currents of hot air, and especially by volcanic eruptions; particles of salt left by the evaporation of salty water also produce dust haze. The most delicate dust haze is produced by myriads of shells and fragments of shells of diatoms and other microscopic forms of life living in fresh-water ponds and in marshes that are dried up at certain seasons of the year. The principal source of this dust is the interior of north Africa, whence it is carried outward in all directions, but especially westward and southward by dry Harmattan winds. A red dust haze of a much coarser grade is carried by southerly winds from northern Africa over into Europe, and in rare cases, as in March, 1901, this is carried to northern Germany and England. Over India a cloud of yellowish dust haze rises day by day higher and higher during the dry season, attaining a general level of from 2000 to 4000 feet, above which

the air is comparatively clear. Dust clouds of less extent are formed over the loess formations of China and North America. The great clouds of smoke from prairie and forest fires, as they subside, leave a hazy atmosphere due to the presence of fine particles of carbon, and it appears likely that each of these gathers to itself a special atmosphere of aqueous vapor, just as spongy platinum absorbs hydrogen. This haze occurs during Indian summer in America and is known as Moor-Rauch in Europe.

The finest dust haze ordinarily produces a whitish or grayish tint in the sky; coarser particles produce buff and reddish tints. When the dust particles are exceedingly small and of regular size, as when they are composed of a few molecules of water, so that their diameters are comparable with some wave length of light, they produce the phenomena of selective reflection and refraction, giving to the sky its ordinary blue tint and forming glories of colored rings around the sun and moon. When they are a little larger, they show the colors of thin plates, and when larger still, they may by diffraction give rise to small glories and larger halos. The vapor dust from the eruption of Krakatoa in 1883 spread over the north temperate zone, producing for a year or two magnificent sunset and sunrise tints and Bishop's Ring, so called after its first observer, Sereno Bishop, of Honolulu. The eruption of Skaptar Jökul in 1783 furnished a similar cloud of aqueous haze and red sunsets to the greater part of Europe and North America; and the same phenomenon, although on a somewhat more restricted scale, followed the eruptions of Pelée on Martinique, the Soufrière on St. Vincent, in 1902, and Katmai, Alaska, in 1912. The colors due to aqueous haze have been most thoroughly investigated by Prof. Carl Barus (see his "Colors of Cloudy Condensation," *United States Weather Bulletin*, No. 12). The haze produced by volcanic eruption is described most fully in the *Report of the Krakatoa Commission* (London, 1887). Consult also an abstract of the report on the haze of 1912-13, in the *Monthly Weather Review* (Washington, April, 1914). See Fog.

HAZEBROUCK, hăz'brōok'. The capital of an arrondissement in the Department of Nord, France, on the Bourre, 37 miles southeast of Calais by rail (Map: France, N., H 2). It has canal communication with the Lys. It is a well-built town, with the sixteenth-century church of Saint-Eloi (spire 260 feet high), an Augustinian convent, part of which is used for a hospital, a linen market, college lecture rooms, and a tobacco warehouse. There are also several educational institutions and a public library. Linen, cloth, starch, dyes, leather, beer, salt, soap, oil, and lime are manufactured, and an active trade is carried on in hops, grain, and cattle. In this most typical of Franco-Flemish towns the Flemish language still lingers. Its name, signifying "the marsh of the hares," is derived from the marshland on which the town is built. Pop., 1901, 13,261; 1911, 12,566.

HAZELNUT, FILBERT, or COBNUt (AS. *hæsel*, Icel. *hasl*, OHG. *hasala*, Ger. *Hasel*, hazel; connected with Lat. *corulus*, OIr., Welsh *coll*, hazel); *Corylus*. A genus of trees and shrubs of the family Betulaceæ, of which the fruit is a nut in a leafy and laciniated cup, the enlarged involucre of the female flower. The male flowers are in cylindrical catkins; the female flowers

mere clusters of colored styles at the extremities of buds. The common hazel (*Corylus avellana*), Lambert's filbert (*Corylus maxima*), and the Constantinople hazel (*Corylus colurna*) are natives of all the temperate parts of Europe. Two species are native to the United States, the American hazel (*Corylus americana*) and the beaked or California hazel (*Corylus rostrata*), neither of which is cultivated. Both species are of wide distribution in America. Most of the cultivated varieties of the hazelnut are known by the names of cobnuts and filberts; the former generally of a roundish form, the latter characterized by the greater elongation and laciniation of the fruit cup. The finer kinds of hazel are propagated by grafting and by layers. Hazel plants for copses are obtained



HAZELNUT (LEAVES AND FRUIT).

from seed. A Himalayan species of hazel (*Corylus ferax*) has a spiny fruit cup and an excessively hard nut. Barcelona nuts are the nuts of a variety of the common hazel, kiln-dried before their exportation from Spain. This process preserves their agreeable flavor. The larva of a weevil (*Balaninus nucum*) feeds on the kernels of hazelnuts, and great numbers of nuts are thus destroyed.

Hazelnuts of improved varieties are grown to a considerable extent in the south of Europe, but only to a slight extent in America. Hazelnuts yield, on pressure, about half their weight of a bland fixed oil, often called *nut oil*. Hazelnut oil has drying properties and is much used by painters; it is also used by perfumers as a basis with which to mix expensive fragrant oils, and it has been employed medicinally in coughs. The wood of the hazel, although seldom large enough for the purpose of the carpenter, is very tough and flexible, and hazel rods are therefore much used for making crates, hurdles, hoops for small barrels, etc. The thicker stems of hazel are used for making charcoal, which is in demand for forges and is much esteemed for artists' crayons.

HAZELTINE, hă'zel-tin, MAYO WILLIAMSON (1841-1909). An American journalist and reviewer, born in Boston, Mass. A graduate of Harvard and later a student at Oxford, England, he practiced law until 1878, when he became literary editor of the *New York Sun*. His original publications include *Chats about Books, Poets, and Novelists* (1883), but he was best known for his reviews in the *New York Sun*.

HAZELTON, hā'zel-ton, GEORGE COCHRANE, JR. (?-). An American lawyer and playwright, born at Boscobel, Wis. He graduated from Columbia Law School in 1895, having previously studied the drama and dramatic writing and played rôles with the Booth-Barrett Company (1890-91) and the Modjeska Company (1891-93). He practiced law in Washington in 1895-97, in Philadelphia from 1898 to 1900, and in New York City after 1901. His writings include: *The National Capitol: Its Architecture, Art, and History* (1897); *Mistress Nell: A Merry Tale of a Merry Time* (1901); *The Raven: The Love Story of Edgar Allan Poe* (1909); and, besides dramatized stories, *Captain Molly* (1902), a play; and *The Yellow Jacket: A Chinese Play*, which, though financially a failure when presented in New York in 1913, was the season's most original and artistically effective production.

HAZEN, CHARLES DOWNER (1868-). An American historian, born at Barnet, Vt. He graduated from Dartmouth College in 1889, studied at the universities of Berlin, Göttingen, and Paris in 1890-92, and received the degree of Ph.D. from Johns Hopkins in 1893. In 1894 he became professor of history at Smith College, and he also lectured at Columbia University in 1910-11. He received the degree of LL.D. from Dartmouth in 1914. He is coauthor of *Historical Sources in Schools* (1902); wrote *Contemporary American Opinion of the French Revolution* (1897), *Old Northampton* (1904), *Europe Since 1815* (1910); and translated Charles Borgeaud's *Adoption and Amendment of Constitutions in Europe and America* (1895).

HAZEN, JOHN DOUGLAS (1860-). A Canadian lawyer and statesman. He was born at Oromocto, New Brunswick, was educated at the University of New Brunswick, and after 1883 practiced law successfully, first at Fredericton and after 1890 at St. John. After serving as mayor of Fredericton he sat in the House of Commons (1891-96) as Conservative member for St. John (city and county), at this time voting for the motion made by Nicholas Flood Davin (q.v.), to extend the Dominion franchise to women. Elected to the New Brunswick Legislature in 1899, he was leader of the Conservative Opposition therein until 1908, when he became Premier and Attorney-General. In 1911, after the defeat of the Laurier administration, he resigned, and was appointed Minister of Marine and Fisheries in the federal administration of the Conservative Premier, Robert Laird Borden (q.v.). Hazen was for a time president of the New Brunswick Barristers' Society, and he was a member of the Inter-provincial and Maritime Provincial Conferences, held at Ottawa in 1910.

HAZEN, WILLIAM BABCOCK (1830-87). An American soldier. He was born in West Hartford, Vt., graduated at West Point in 1855, and served for a time on the frontier. In the spring of 1861 he was promoted captain in the regular infantry, but he raised the Forty-first Regiment of Ohio Volunteers and went to the front as its colonel. He defended the Ohio border, fought in Kentucky, commanded a brigade in the movement by way of Nashville to Pittsburg Landing, won distinction at Shiloh, Corinth, and the battle of Stone River, and at Missionary Ridge captured 18 pieces of artillery. He served through the Atlanta campaign and commanded the Second Division of the Fifteenth Corps in

Sherman's march through Georgia. He was promoted major general of volunteers in 1864, for his services at the capture of Fort McAllister, and in the summer of 1865 he commanded the Fifteenth Army Corps. At the close of the war he was brevetted major general, United States army. He served on the frontier as colonel of infantry from 1865 to 1880, except during his stay in France, in the Franco-German War, and at Vienna, as military attaché to the United States Legation during the Turko-Russian War. In 1880 he became chief signal officer, with the rank of brigadier general. He did much to raise the character of the signal service by employing expert physicists, electricians, and meteorologists, and by coöperating with State weather bureaus and scientific societies. By his efforts the present standard-time meridians were adopted. He also introduced the "cold-wave" signals and the system of hourly weather bulletins. His publications include: *The School and the Army in Germany and France, with a Diary of Siege Life at Versailles* (1872); *Our Barren Lands* (1875); *A Narrative of Military Service* (1885).

HAZLETON. A city in Luzerne Co., Pa., 28 miles (direct) south by west of Wilkes Barre, on the Lehigh Valley, the Wilkes Barre and Hazleton, and the Pennsylvania railroads (Map: Pennsylvania, K 5). It has a picturesque site at an elevation of 1700 feet and enjoys some popularity as a summer resort. It is the seat of a State hospital for miners and of the township high school and has Hazle Park, a summer resort, United Charities Home, a public library, and a fine city hall. Hazleton is the centre of the anthracite coal district and is extensively interested in coal mining. Its silk mills have become of considerable importance, and there are also ironworks, knitting mills, cornice works, coffin and casket factories, breweries, and manufactories of shirts, paper boxes, underwear, macaroni, etc. Settled in 1820, Hazleton was incorporated as a borough in 1856 and in 1892 was chartered as a city. The commission form of government was adopted in 1913. Pop., 1900, 14,230; 1910, 25,452; 1914 (U. S. est.), 27,511.

HAZLITT, hāz'līt, WILLIAM (1778-1830). A distinguished English critic and essayist. He was born at Maidstone in Kent, April 10, 1778, where his father was then a Presbyterian minister, though afterward a Unitarian. The latter went to America when Hazlitt was five years old, but returned three years later and settled at Wem in Shropshire. The son was at first privately educated and then sent to the Unitarian College at Hackney. He did not take kindly to dissenting theology, and, after leaving college in 1795, spent the next few years at his father's house, dabbling in metaphysics and painting. His intellectual life, on the one hand, was keenly stimulated by his meeting with Coleridge in 1798, and by hearing the last sermon preached by the philosopher, which profoundly impressed him. His artistic tastes, on the other hand, led him to Paris in the winter of 1802. He spent his time there copying pictures in the Louvre, and, returning to London, took up the profession of portrait painting. He attained no great success in this, but it brought him into literary and artistic society, of which on the latter side his *Conversations with Northcote* (1830), though belonging to a later period, is the best memorial, while on the former the association

with Lamb, Hunt, and Godwin brought out the taste for pure literature, in which he was to win the triumphs denied him in the two fields of his earlier predilection. His grave *Essay on the Principles of Human Action* (1805), though his own favorite work, did not please the public. In 1808 he married, and settled at Winterslow, near Salisbury; but neither he nor his wife seems to have been well adapted for domestic life in the country. "Never, I suppose," writes his grandson, "was there a worse-assorted pair." The divorce, however, which finally separated them did not come until 1822. In 1812 Hazlitt came back to London, where at first he was parliamentary reporter and dramatic critic for the *Morning Chronicle*. Presently, however, he found the line that suited him and began to pour forth the remarkable series of literary criticisms on which his highest fame rests. With Leigh Hunt he tried in the *Examiner*, in 1815, to revive the glories of the *Spectator* and the *Tatler*; the best of the essays thus produced were published in 1817 under the title of *The Round Table*. His chief critical works are: *Characters of Shakespeare's Plays* (1817); *A Review of the English Stage* (1818); *Lectures on the English Comic Writers* (1819); *Lectures on the English Poets* (1818), with essay from the "Round Table" on *Love of the Country*; and *Lectures on the Dramatic Literature of the Reign of Queen Elizabeth* (1821). Coming at a time when Coleridge had just begun really to make people see what was in Shakespeare, and aiding Lamb and Hunt to recall to the memories of Englishmen the glories of their half-forgotten golden age, his criticism was of the highest importance; and he joined with the two last named in establishing an easy, flowing, familiar style of prose which was to have great results throughout the remainder of the century. Saintsbury places him in the first rank as a critic, his distinction lying not so much in systematic judgment as in the most valuable particular appreciations; and Stevenson, the most charming practitioner in the same prose style, takes his leave of him with, "though we are mighty fine fellows nowadays, we cannot write like Hazlitt." He and his group show in criticism the effects of the Romantic movement—a widening of the judgment, an importation of human sympathy and the personal equation, and a combination of philosophic discussion of life with bookish details. His temperament was uneven and self-tormenting; it estranged him more or less from all his friends, even for a time from Lamb. One of the most curious episodes in his career is the romantic passion which he conceived for a very ordinary girl, Sarah Walker by name, of a menial station and no attractions that others could see; Hazlitt recorded his emotions during its progress in a little book of extreme interest as a psychological document, called *Liber Amoris, or the New Pygmalion* (1823; new ed., New York, 1902). Soon after his divorce he married a widow, apparently on a sudden impulse, but after a year's travel on the Continent they, too, separated. The most important literary works of his later life are: *Table Talk* (1821-22); *The Spirit of the Age* (1825); *The Plain Speaker* (1826); *Sketches and Essays* (1829). His *Life of Napoleon* (4 vols., 1828-30), of whom he was an ardent admirer, was neither a literary nor a financial success. Disappointed and harassed by anxieties, he died on Sept. 18, 1830, with

Charles Lamb at his bedside; his last words, despite all that he had suffered, were, "Well, I've had a happy life." His *Literary Remains* were issued in 1836. Consult: W. C. Hazlitt, *Memoirs* (London, 1867); an excellent volume of selections in the Cavendish Library (ib., 1889), with introduction by A. Ireland, who has also compiled a *List of the Writings of Hazlitt and Hunt* (ib., 1868); his *Life* by A. Birrell, in the "English Men of Letters Series" (ib., 1902); also Saintsbury in *Essays in English Literature 1780-1860* (ib., 1890); id., in *History of Criticism III* (ib., 1900 et seq.); Leslie Stephen in *Hours in a Library* (2d series, ib., 1877); the essay on Hazlitt in C. T. Winchester, *A Group of English Essayists* (New York, 1910); J. Zeitlin, *Hazlitt on English Literature* (Oxford, 1913). A complete edition of his works, in 12 volumes, introduction by W. E. Henley, was published in 1902.

HAZLITT, WILLIAM (1811-93). An English writer, son of the essayist. He became a lawyer and was appointed registrar of the Court of Bankruptcy in London in 1854, a position he held until 1891. He edited the writings of his father and made numerous translations, notably of works of Guizot and Thierry. He was also the author of books on the law of bankruptcy. Consult W. C. Hazlitt (his son), *Four Generations of a Literary Family* (London, 1897).

HAZLITT, WILLIAM CAREW (1834-1913). An English man of letters, grandson of the essayist. He was born in London, studied law and civil engineering, but became a journalist, and finally devoted himself to literature. His works include: *History of the Venetian Republic* (4 vols., 1860); *Memoirs of William Hazlitt* (2 vols., 1867); *Poems* (1877); *Offspring of Thought and Solitude* (1884), essays; *Coins of Europe* (1893-97); *Coin Collector* (1896); *Four Generations of a Literary Family* (2 vols., 1897); *The Lambs: Their Lives, their Friends, and their Correspondence* (1897); *Lamb and Hazlitt* (1899); *Shakespeare: The Man and his Work* (2d ed., 1903); *Faiths and Folk Lore* (1905); *The Hazlitts* (privately printed, 1911). He also edited *Dodsley's Old Plays* (15 vols., 1874-76); *Shakespeare's Library* (5 vols.); *Lamb's Letters* (1880). As a bibliographer, he did good service in *Bibliographical Collections and Notes on Early English Literature* (1903), and in its predecessor, *Handbook to the Popular, Poetical, and Dramatic Literature of Great Britain* (1867; supplemented in 1876, 1882, 1887, and 1889).

HAZZAKEN. See HILLEL.

HEAD. See SKULL; NERVOUS SYSTEM.

HEAD, BARCLAY VINCENT (1844-1914). An English numismatist, born at Ipswich and educated there at St. Elizabeth's School. He was made assistant in the British Museum in 1864 and in 1893 keeper of the department of coins and medals. He became a member of the Imperial German Archaeological Institute, a *lauréat* of the French Institute, and joint editor of the *Numismatic Chronicle*. He wrote a history of Greek coinage (1874-1901); a *Guide to the Coins of the Ancients* (1881); *The Young Collector's Handbook of Greek and Roman Coins* (1883); the very valuable manual, *Historia Numorum* (1887; 2d ed., 1911); and *A Guide to the Principal Gold and Silver Coins of the Ancients in the British Museum* (4th ed., 1895).

HEAD, SIR EDMUND WALKER, BART. (1805-68). An English Governor-General of Canada.

He was born near Maidstone, Kent, was educated at Winchester and Oxford, and was a fellow of Merton College (1830-37), a university examiner, and a law student. Succeeding to his father's title in 1838, he was Poor-Law Commissioner in 1841, went to New Brunswick six years later as Lieutenant Governor, and from 1854 to 1861 was Governor-General of Canada. During Sir Edmund's term of office the clergy reserves and seigniorial tenures were abolished, the Victoria Bridge at Montreal was built, and Ottawa was chosen by the Queen as capital of Canada. After his return to England he was made a civil-service commissioner. He published a *Handbook of the Spanish and French Schools of Painting* (1845); *Shall and Will, or Two Chapters on Future Auxiliary Verbs* (1856); *The Temple of Serapis at Pozzuoli* (1858); *Viga Glum* (1866), a translation of an Iceland story. He also edited Kugler's *Handbook of Painting of the German, Flemish, Dutch, Spanish, and French Schools* (1854) and *Lewis's Essays on the Administrations of Great Britain* (1864). His poetical contributions to *Fraser's Magazine* were published posthumously in 1868.

HEAD, SIR FRANCIS BOND (1793-1875). An English colonial Governor and author, of Portuguese-Jewish descent. He was born at the Hermitage, Higham, Kent, Jan. 1, 1793, and was educated at Rochester and in the Woolwich Military Academy, where he was made first lieutenant of engineers in 1811. He saw service on the Continent and was at the battle of Waterloo, but retired on half pay in 1825, when he went to South America to prospect in gold and silver mines. His first work recounted his experiences under the title, *Rough Notes of a Journey in the Pampas and Andes* (1826), and the rapidity of his traveling gained him the nickname "Galloping Head." In 1835-37 he was Lieutenant Governor of Upper Canada. Knowing nothing of the political situation of the country, he opposed the union of the provinces and assumed that a popular desire for responsible government merely indicated a desire for annexation to the United States. He fancied he could govern without the aid of his council and through his bad judgment and want of tact seems to have been largely to blame for the Upper Canadian share in the rebellion of 1837. He was made Baronet in 1837; he died in Croydon, July 20, 1875. Among his published works are: *Life of James Bruce* (1830); *Bubbles from the Brunnen of Nassau* (1833); *A Narrative* (1839)—the author's account of his administration of the government in Upper Canada; *The Emigrant* (1846); *Stokers and Pokers* (1849); *Defenceless State of Great Britain* (1860); *A Fortnight in Ireland* (1852); *Fagot of French Sticks* (1852); *The Horse and his Rider* (1860); *The Royal Engineer* (1869); *Sketch of the Life of Sir J. M. Burgoyne* (1872). Consult Kingsford, *History of Canada*, vol. x (London, 1893).

HEAD, SIR GEORGE (1782-1855). An English traveler, elder brother of Sir Francis Bond Head. He was born in Higham Parish, Kent, was educated at the Charterhouse School, and went to the Peninsular War as a commissary clerk, rising gradually to be next to the head of the commissariat in 1814. This experience provided material for his *Memoirs of an Assistant Commissary-General* (1837), while from his five years' service in Halifax he gleaned *Forest Scenery and Incidents in the Wilds of North America* (1829). William IV knighted

him (1831), and Queen Victoria made him her deputy knight marshal at her coronation. He was best known as the author of *A Home Tour through the Manufacturing Districts of England* and *A Home Tour through Various Parts of the United Kingdom*, reprinted, in one volume, in 1840. He was also a translator of Apuleius and the translator of Cardinal Pacca's *Memoirs*.

HEAD'ACHE, medically termed CEPHALALGIA. A pain in any part of the head except the face. It is a symptom of heat stroke, cerebral apoplexy, eyestrain, nasal disease, middle-ear or internal-ear disease, uterine disease, neurasthenia, etc. Treatment of headache as a disease, or by the use of "headache powders" so commonly sold, is therefore ridiculous. The most severe headaches are those accompanying meningitis or brain diseases, tumor of the brain usually causing great suffering. These are generally brow or vertex headaches. Many fevers, such as typhoid, have a severe general headache as a symptom. Sufferers from Bright's disease have daily frontal headache in many instances. Eyestrain is probably the most frequent cause of frontal, temporal, and the so-called recurrent "sick headaches." The pain is sometimes referred to the back of the neck, or occipital region. Diseased conditions of the accessory nasal sinuses (see NOSE) and of the nasal chambers themselves are often the causal factors in daily or periodical headaches. Gastric dyspepsia causes headache referred to the brows. The headache of constipation or of caries of front teeth is generally experienced over the brows and temples; that of anæmia, or bladder disease, or endometritis, at the vertex; that of carious back teeth, eyestrain, and middle-ear disease, at the temple as well as at the mastoid cells behind the ear; that of neurasthenia generally at the base of the occiput, though also at the brow; while derangement of the liver causes pain which may be felt over the whole occiput. Syphilis and malaria are also causes of headache of irregular distribution. Migraine (q.v.) is a headache affecting one side of the head and accompanied by nausea and vomiting and other symptoms, and is due to nerve fag, gout, indigestion, or eyestrain, or malaria in people of nervous diathesis. Gout is a frequent cause of headache, as is also alcoholic indulgence. Domestic treatment of headache should begin with copious drafts of water and a cathartic, with rest in the recumbent position in the dark, and abstinence from food for a few hours. Drugs, especially narcotics, should be taken only upon a physician's advice after study of the sufferer's environment, vocation, diet, and physical condition. Frequent use of strong alleviatives is often undermining and damaging. Among the drugs used are aconite, belladonna, antipyrin, acetanilide, codeia, morphia, phenacetin, bromides, chloral, ergot, mineral acids, salol, salicylic acid, iodides, strychnine, nitroglycerin, quinine, alkalies, digestants, and cathartics. Consult Behan, *Pain* (New York, 1914).

HEAD'DRESS. Among social badges the headdress is of great interest. As distinguished from the clothing of the body, which may arise from the desire for ornament, for comfort, or for protection, the headdress was a distinctive mark, representing the organization of groups of men in primitive times. The sexes also were thus discriminated. This feature has persisted to this day, though it is now giving way before the unifying powers at work on the race.

In the study of headdresses there must be taken into consideration the varieties of natural head covering, which determine the extent of the use of the artificial headdress, the environment regulating the materials, and the need of protecting the head from cold, heat, rain, etc. To these must be added the degree and course of the advancement of the peoples, their religious beliefs and customs, and in greatest measure the æsthetic sense which pervades and modifies all these classes.

As Deniker remarks, the nature of the hair in the different divisions of mankind furnishes the broad groundwork for headdress. People with woolly hair, as the negroes, arrange it in the most complicated fashion. Smooth-haired peoples allow it to flow behind, as the Malays and some Americans, or gather it in plaits, whorls, chignons, rolls, as among the Eskimo, Koreans, Japanese, Chinese. The fuzzy-haired peoples of north Africa and Melanesia reach the acme with their great mops fantastically arranged. Following the almost instinctive desire of the human race to improve on nature, to alter and make distinctive the hair, we have dyeing, plastering with clay or oils, and the wearing of wigs practiced by many tribes. On the other hand, among lower tribes, as the Australians and Veddas, little attention is paid to the hair, which remains in its primitive luxuriance and untidiness. To the hair are also attached feathers, flowers, etc., often as ornaments, but most frequently as a badge or token, familiar in the plumes of the North American Indians.

Perhaps the most primitive headdress, well-nigh universal among smooth-haired peoples, is the fillet, originating in the need of securing the hair, and by its material, color, and other characters serving as a badge. The fillet thus appears to be the ancestor of all hats. The ancient Chinese, as well as the Greeks, were fillet wearers, and the custom survives in the present, while many people have discarded the custom within recent times. The turban is a development of the fillet. From the fillet most headdresses arose by additions horizontally or vertically, the structure remaining crownless for a long period. It is probable that devices for holding the feather or bunch of feathers in the hair may have developed certain types of headdress. The more important of man's activities that have distinctive classes of headdress are the chase, war, rank, social position, and religious ceremony. Protection may also be mentioned as more particularly an outgrowth of environment, the ears rather than the head being covered from both heat and cold. The headdress of hunting tribes embraces features connected with stalking of game and fetishism, as well as the shading of the eyes and of the head.

The headgear of war, originally designed to strike terror into the enemy as well as to show rank, is represented by the helmet. A much wider range of headdress marks rank and social position. This class has its highest development in the Orient, as in eastern Turkestan and Korea, e.g., where the headdress of each individual is an index of his standing. In ceremony the most extensive and interesting phase of this subject is presented. We have here repeated the ranks from priest king, through priest to worshiper, the head covering for different ceremonies, and as belonging to the hosts of spiritual beings. With this also are connected the class of masks, which are largely, if not entirely, to be taken as headdresses. It will be

found that each of the divisions presented has its own ceremonial headdresses. Consult G. W. Rhead, *Chats on Costume* (New York, 1906). See HAIRDRESSING.

HEAD FORM, CHANGES IN. See IMMIGRATION; INDEX, CEPHALIC.

HEAD-HUNTING. Head-hunting has in past times been practiced by many peoples, scattered all over the world, but at the present time is confined to a few tribes remote from civilization. An enemy's head served as a war trophy, and the possession of it was supposed to be proof of the prowess and courage of the owner. A warrior's standing in his tribe and the chances of his obtaining a desirable bride would be largely regulated by the number of heads he had taken. These heads were often used in various rites and ceremonies. The following are some of the best-known head-hunters of more recent times: the Was, a hill tribe on the northeastern frontier of India; the Kukis and the Nagas of Assam. The custom was common to all the Malay races and has not been entirely suppressed in some parts of Borneo. The Land Dyaks of Sarawak had a special house for keeping the heads. The Iban (or Sea) Dyaks, essentially an agricultural people, are, according to Professor Haddon, passionately devoted to head-hunting, often joining the Malays in their large war prahus on extended piratical raids; the plunder went to the Malays and the heads of those killed to the Dyaks.

Until very recently the people of the island of Kiwai, British New Guinea, were head-hunters. The head of an enemy was cut off with a bamboo knife and afterward hung over a fire until the hair was singed off. While this was being done, all the young girls danced in a ring near by. The flesh was then removed, the skull washed, and a carved peg stuck into it, by means of which it was hung up on the main post of the house. A young man of Kiwai could not marry unless he had at least one skull as a trophy.

In the Philippine Islands the practice, according to Dean C. Worcester, was limited to tribes of the northern part of Luzon—the Negritos, Ifugaos, Tingians, Kalingas, and the Bontoc Igorots. The practice still persists in the remote parts of the subprovinces of Kalinga and Apayao and among the Negritos of the all but unknown coast of northern Luzon. South America furnishes two well-known head-hunting tribes, the Mundurucu of Brazil and the Jivaros of Ecuador. The Mundurucu



SHRUNKEN HUMAN HEAD.
War Trophy of Jivaros Indians
of Ecuador.

get their heads from their enemies of the Yuruna and Parentintim tribes. The trophies of the Jivaros are the familiar "shrunken human heads" to be seen in most museums. The bones of the skull are removed and hot stones introduced, which are replaced by others as they become cool. The head is kept constantly turning, another person taking it when the operator tires. The process lasts some days, and the head is reduced to the size of an orange. Long cords hang from the closed lips, and feather ornaments, like tassels, from the ears. Consult: Carl Bock, *Head-Hunters of Borneo* (London, 1882); A. C. Haddon, *Head-Hunters Black, White, and Brown* (ib., 1901); Worcester, in *National Geographic Magazine* (Washington, September, 1912); C. D. Willcox, *Head-Hunters of Northern Luzon* (Kansas City, Mo., 1912); A. J. N. Tremearne, *The Tailed Head-Hunters of Nigeria* (London, 1912).

HEADLAM, héd'lám, ARTHUR CAYLEY (1862-). An English theologian, born in Whorlton, Durham. He was educated at Winchester and at New College, Oxford; was fellow of All Souls', Oxford, in 1885-97, and theological lecturer in Oriel, Queen's, and Trinity; and (after being rector of Welwyn, Herts, for seven years) in 1903 became professor of dogmatic theology in King's College, London, of which he became a fellow in 1905. He published: *Ecclesiastical Sites in Isauria* (1893); a commentary on Romans (1895), with Sanday; *Sources and Authority of Dogmatic Theology* (1903); *History, Authority, and Theology* (1909); *St. Paul and Christianity* (1913).

HEADLAM, WALTER GEORGE (1866-1908). An English Greek scholar. He graduated in 1887 from King's College, Cambridge, where he became a fellow in 1890. He specialized on the criticism of the newly discovered text of Herondas and also in the study of the Greek tragedies. He translated *Æschylus' Suppliants* (1900), *Agamemnon* (1904), *Choëphori* (1905), *Eumenides* (1908), *Prometheus* (1908); edited the *Fragments of Sophocles* (1908) to complete Jebb's edition of that poet; and published *A Book of Greek Verse* (1907). Consult *Walter Headlam: His Letters and Poems*, with a memoir by Cecil Headlam and a bibliography by L. Howard (London, 1910).

HEADLEY, héd'li, JOEL TYLER (1813-97). An American historical writer. He was born in Walton, N. Y., graduated at Union College in 1839, studied at Auburn Theological Seminary, and was for a time pastor of a church in Stockbridge, Mass. His health soon failing, he traveled in Europe and then joined the editorial staff of the *New York Tribune*. Soon, however, he was compelled to spend a considerable portion of every year in the Adirondacks for his health. His newspaper letters on the region, afterward published as *The Adirondack, or Life in the Woods* (1849), are said to have been the first to attract attention to that region as a health resort. Among his works are: *Napoleon and his Marshals* (2 vols., 1846); *Washington and his Generals* (1847); *Life of Cromwell* (1848); *Life of Washington* (1857), which was at one time exceedingly popular; *The Chaplains and Clergy of the Revolution* (1864); *The Great Rebellion* (2 vols., 1863-66); *Grant and Sherman: Their Campaigns and Generals* (1866); *Farragut and our Naval Commanders* (1867); *Stanley's Adventures in the Wilds of Africa* (1890); *Our Army*

in the Great Rebellion (1891); *Our Navy in the Great Rebellion* (1891).

HEADLEY, PHINEAS CAMP (1819-1903). An American clergyman and biographer, born in Walton, N. Y. He was admitted to the bar before studying for the ministry at Auburn Seminary. His publications include: *Empress Josephine* (1850); *Lafayette* (1851); *Kossuth* (1852); *General Sheridan and Admiral Farragut* (1864); *General Sherman* (1865); *General Grant* (1866); *Public Men of To-day* (1882).

HEADLONG HALL. A satirical novel, interspersed with lyrics, by Thomas Love Peacock, published in 1816.

HEAD-MONEY TAX. The term applied to a tax levied by an Act of Congress, passed in August, 1882, which provided that there should be collected "a duty of fifty cents for each and every passenger, not a citizen of the United States, who shall come by steam or sail vessel from a foreign port to any port within the United States. . . . The money thus collected shall be paid in to the United States Treasury, and shall constitute a fund to be called the Immigrant Fund, and shall be used, under the direction of the Secretary of the Treasury, to defray the expense of regulating immigration under this act, and for the care of immigrants arriving in the United States," etc. This act of Congress is similar in its essential features to statutes enacted by many States of the Union for the protection of their own citizens, and for the good of the immigrants who land at seaports within their borders. A statute of New York covering this ground was, however, held void as infringing upon the ground of national legislation (92 U. S. Rep., p. 259, and 107 U. S. Rep., p. 59). The questions arising under the act of Congress were considered by the Supreme Court of the United States in what were called the Head-Money cases (112 U. S. Rep., p. 580), and the act was held valid. In 1903 the tax was increased to \$2 per head. By Act of Feb. 20, 1907, as amended by Act of March 26, 1910, the tax was again increased to \$4 per head. See IMMIGRATION.

HEADSMAN, THE. A novel by J. Fenimore Cooper (1833), the story of the hereditary executioner of Bern.

HEALD. See HEDDLE.

HEALD, hêld, FREDERICK DE FOREST (1872-). An American botanist, born at Midland City, Mich. He graduated from the University of Wisconsin in 1894 and from the University of Leipzig (Ph.D.) in 1897. He taught botany in several institutions, in 1906 being appointed professor of agricultural botany and botanist at the Nebraska Experiment Station (in 1907 also State botanist); had charge of the School of Botany at the University of Texas in 1908-12; and after 1912 was agent in forest pathology of the United States Department of Agriculture. In 1911 he became associate editor of *Phytopathology* and in 1912 was elected president of the American Microscopical Society. He published: *Laboratory Manual in Elementary Botany* (1902), *Symptoms of Disease in Plants* (1909), *Experiments in Plant Physiology* (1910), with I. M. Lewis, and revised C. R. Barnes's *Analytic Keys to Genera and Species of North American Mosses* (1897).

HEALEY, GEORGE PETER ALEXANDER (1808-94). An American portrait painter. He was born at Boston, studied in Paris under Gros, and was much influenced later by Couture. At the

Paris Exposition of 1855 he received a second-class medal. He returned to the United States in 1858, going to Chicago, where he resided until 1867. After this he went to Rome, and in 1885 he opened a studio in Paris, where he remained until 1892. Returning to Chicago, he died June 24, 1894. Healey is one of the best American portrait painters of the middle period. His drawing is sound, his color pleasing. His portraits vary in quality from strong and characteristic likenesses to insipid productions. His historical works are little more than collections of portraits. The principal are: "Franklin Urging the Claims of the American Colonies before Louis XVI" (1855) and "Webster's Reply to Hayne," Faneuil Hall, Boston, containing 130 portraits. Some of the best-known portraits are: M. Guyot (1841), Smithsonian Institution; Pius IX (1871), Convent of the Sacred Heart, Albany; Louis Philippe, General Grant (1878); Webster, Clay, Calhoun; Presidents Quincy Adams, Jackson, Van Buren, Tyler, Taylor, Fillmore, Pierce, Polk, Buchanan, and Lincoln—all in Corcoran Gallery, Washington; Generals Grant and Sherman, Newberry Library, Chicago; William H. Seward, State Library, Albany; James Lenox (1851), in the Public Library, New York; and a portrait of the artist in the Metropolitan Museum, New York. Consult his autobiography, *Reminiscences of a Portrait Painter* (Chicago, 1894).

HEALTH (AS. *hælp*, from *hāl*, Goth. *hails*, OHG., Ger. *heil*, Eng. *whole*; connected with OChurch Slav. *celŭ*, whole, OPruss. *kailŭstikan*, health, OIr. *cél*, augury, and probably with Skt. *śiva*, healthful, kind). The condition of a living body in which all the tissues are in a state of soundness or integrity and the organs perform their functions normally, in which waste and repair go on progressively, and in which proper growth or retrograde metabolism occurs, according to the age of the individual, disease being absent. Disease is present when the integrity of the blood or of other tissues is impaired, where function is disordered, or where excessive growth or abnormal retrogression and decay occur. Perfect health is rarely seen, and never continues for any considerable portion of life in the artificial conditions of modern existence among civilized people. Health is therefore a comparative term.

Health officers are elected or appointed in all towns of any size in the United States, whose duty it is to limit the spread and prevent the invasion of disease, to enforce sanitary laws, and take all precautions to safeguard the health of citizens. See **HEALTH, BOARDS OF**.

The reports of occurrence of disease and death are recorded by county, State, and national health officials. (See **DISTRIBUTION OF DISEASE; VITAL STATISTICS**.) For the consideration of measures to safeguard the public health, see **SANITARY SCIENCE**; and for a consideration of the laws of health, see **HYGIENE**.

HEALTH, BILL OF. In shipping, a certificate of a consul, or health officer, as to the health of the crew, when the ship has come from a suspected port. A clean bill, a suspected bill, and a foul bill are the three short names given to the several degrees of health.

HEALTH, BOARDS OF. Institutions organized under government and deriving powers from the laws for the purpose of protecting the health of the citizens.

created for the purpose of controlling and repressing agencies which undermine the health of the residents of a city or a municipality. The function of such a board is to adopt ordinances which compose a sanitary code, under which certain measures may be enforced and the authority of the officers of the board may be maintained. Such a code includes provisions for the prevention of fraud and pretense in the preparation and sale of medicines, or of the sale of poisons except for lawful uses and purposes; of adulteration of coffees, teas, and other preparations from which beverages are made; for the control of the construction of buildings, ventilation, drainage, and plumbing; for the control of the sale of food and drink, to prevent stale, unwholesome, or unhealthy food, as well as adulterated or watered milk, from being offered in the market; to control the passage of cattle, horses, or any dangerous or offensive animals through the public streets; to regulate slaughtering and slaughterhouses; to exercise care over sidewalks in streets; to regulate the sanitary condition of pounds; to kill animals afflicted with hydrophobia; to prevent or limit offensive odors and liquids from any source; to provide for proper accumulation and removal of filth and dirt; to prevent diseased animals from being brought into the city, or dead, sick, or injured animals being left in the streets; to provide for the notification of contagious and infectious diseases; to control the unloading of vessels, the removal of sick persons, vaccination, exposure to disease, handling and interment of dead bodies; to outline the duties of coroners; to secure the reporting of vital statistics; to regulate matters relating to vehicles used for passenger transportation; and to control noise, expectoration in public conveyances, life lines at bathing places, etc.

As an example of a municipal board of health, the organization of the health department in New York City may be described, as it has existed since the adoption of the charter creating the Greater New York. In chap. xix of this charter the several powers and duties of the health officers are set forth in detail. The head of the department is called the president of the board of health. The board consists of a single commissioner of health, commissioner of police, and the health officer of the port. The commissioner of health is appointed by the mayor (as is also the commissioner of police), and is the president of the board and the executive officer. He may or may not be a physician. He has absolute power to control any condition he deems deleterious to health.

Two bureaus have been established under the act of Legislature. The chief executive officer of one is called the sanitary superintendent, who at the time of his appointment must have been for at least 10 years a practicing physician and for three years a resident of the city. The chief officer of the second bureau is the registrar of records. An office of the board of health is established in each of the different boroughs of the city, wherein the business of the department is transacted. An assistant sanitary superintendent and an assistant registrar of records are appointed for each borough. In addition to these officials there are a chief and a borough chief of each of the following divisions: general sanitary inspection, contagious diseases, communicable diseases, child hygiene, a supervising

tory, a director of the research laboratory, a superintendent of hospitals, and a chemist. Similar municipal boards of health exist in other cities.

State Boards of Health. These are institutions established by State legislative enactments, having many specific relations to the public health, and intended to have a central advisory relation to the local sanitary organizations, and also to supervise a State system of vital statistics. In 1913 there were 54 State boards in existence in the States and Territories of this country. The first organization under this name in the United States was established in Louisiana in 1855, but under the present acceptance of the term it is not to be classed with the average State board of health, as it was created for the sole purpose of maintaining a quarantine for the protection of New Orleans. Following are the dates in which boards of health were established in the different States and Territories: Massachusetts, 1869, under a law for which successive legislatures had been asked since 1856; California, 1870; Virginia and Minnesota, 1872; Michigan, 1873; Maryland, 1874; Alabama and Georgia, 1875; Colorado and Wisconsin, 1876; Mississippi, New Jersey, Tennessee, and Illinois, 1877; Connecticut, Kentucky, Rhode Island, and South Carolina, 1878; Delaware and North Carolina, 1879; Iowa and New York, 1880; Arkansas, Indiana, West Virginia, and New Hampshire, 1881; Missouri, 1883; Maine, Kansas, and Pennsylvania, 1885; Ohio and Vermont, 1886; Florida and North Dakota, 1889; Nebraska, Washington, Oklahoma, and South Dakota, 1891; Nevada, 1893; New Mexico, 1895; Utah, 1898. Since 1898 the following State boards have been established: Arizona, District of Columbia, Idaho, Montana, Oregon, Texas, Wyoming; and Territorial boards have been organized in Hawaii, Philippine Islands, Porto Rico, and in the Canal Zone.

As an example of the organization of a State board of health, that of New York may be mentioned, which is composed of a single commissioner, assisted by a deputy commissioner and a secretary. These constitute the board of administration. There are, in addition, a division of sanitary engineering, with a chief engineer and assistants; a division of laboratory work, consisting of a director of State laboratories, a chief sanitary chemist, water analyst, and bacteriologist. The divisions of vital statistics, communicable diseases, publicity, and education are each headed by a director. There are also a consulting staff of specialists, viz., dermatologist, ophthalmologist, orthopedist, laryngologist, and statistician, and a tuberculosis advisory board consisting of nine physicians; scattered through the State are 45 medical officers of the department.

National Board of Health. A national board of health was organized in 1879. At the end of four years this board went out of existence, having investigated diseases of food-producing animals, adulteration of food and drugs, disposal of sewage; having established quarantine, and secured consular reports regarding disease and sanitation. At present these labors are performed by the Bureau of Animal Industry, various food commissioners, and the United States Marine Hospital Service (now called the United States Public Health Service), which is connected with the Department of the Interior. Some Congressmen favor a proposition to create

a national board of health, at whose head shall be a secretary of health, who shall be a member of the cabinet.

HEALTH, PUBLIC. See HEALTH, BOARDS OF; SANITARY SCIENCE.

HEALTH ASSOCIATION, AMERICAN PUBLIC. On April 18, 1872, an informal conference was held in the city of New York of representatives of five States and five cities, at which a committee was appointed to draw up a constitution for the organization of a national institution for the promotion of sanitary science. The committee made its report at a subsequent meeting, held September 12 and 13, at which a constitution was adopted and officers elected. The objects of the association are to a great extent served by annual meetings, the thirtieth of which was held at Havana, Cuba, in 1912, when matters of importance relating in various ways to sanitary science are discussed, the essays and addresses being published in the *American Journal of Public Health*, the official organ of the association. The association has exerted considerable influence in the improvement of the sanitary condition of the country.

HEALTHS, DRINKING. See DRINKING USAGES; TOAST.

HEALY, TIMOTHY MICHAEL (1855-). An Irish Nationalist leader, born at Bantry, County Cork. During the decade preceding his birth the potato famine had wrought frightful havoc in southern Ireland, and young Healy, whose nature was vehement and excitable, grew up with a burning hatred for English rule in Ireland. Until his thirteenth year he attended St. Colman's College at Fermoy. Further opportunities of education were denied him, but it is characteristic of his energy and industry that he became one of the best-informed men in the House of Commons, intimately acquainted not only with English but also with French and German literature. Associating himself with the "active" section of the old Home Rule party, he gained the attention of Parnell, who was greatly attracted by the bright, industrious, sleeplessly active young Irishman. In 1880 Healy was nominated and returned without opposition as member for Wexford. A quarter of an hour after he had taken his seat he horrified the House of Commons by his maiden speech, which gave evidence of fierce conviction rather than promise of the oratorical power he later gained. Healy made a thorough study of the Irish land question—it was said that there were but three men who knew the Land Bill, Mr. Gladstone, Mr. Law, and Mr. Healy. Working night and day, he obtained many concessions and finally secured the adoption of the Healy Clause, which forbids increases in rent because of tenants' improvements. He then went on a lecture tour in the United States, which netted \$250,000 for the Land League. On his return to England he was cited to appear before the Queen's Bench, and, upon refusing to give bail, was sentenced to a half-year's imprisonment, but he was released at the expiration of four months. In 1882 he married Erina, daughter of T. D. Sullivan, the Irish ballad writer. Reëntering Parliament in 1880, as member for Wexford, he continued his parliamentary career; sitting for Monaghan (1883-85), South Londonderry (1885-86), North Longford (1887-92), North Louth (1892-1910), and Northeast Cork after 1911. In 1891 he opposed Parnell and nominated Justin McCarthy as chairman of the anti-

Parnellite party. Nine years later Healy was instrumental in reconciling both factions by the nomination of John Redmond as chairman of the Irish Nationalist party. He was called to the Irish bar in 1885 and received the compliment of a "special call" to the English bar in 1903. He was elected bencher of King's Inn, Dublin, in 1905 and bencher of Gray's Inn in 1910 and was made K.C. in 1910. In the opinion of many his pen is even more effective than his tongue; his writing is characterized by mordant wit, happy illustration, trenchant argument, liveliness—the prime requisites of effective journalism. He is author of *Why there Is an Irish Land Question and an Irish Land League* (1881); *A Word for Ireland* (1886); *Loyalty Plus Murder; Why Ireland Is not Free; Stolen Waters: A Page in the Conquest of Ulster* (1913).

HE AND SHE BIBLE. See BIBLE, CURIOUS EDITIONS OF.

HEANOR, hē'nēr. A town in Derbyshire, England, 8 miles northeast of Derby. It has large hosiery works and important coal-mining and iron-manufacturing industries. Pop., 1901, 16,250; 1911, 19,851.

HEAP, DAVID PORTER (1843–1910). An American engineer, born in San Stefano, Turkey, and educated at Georgetown College, District of Columbia, and at West Point, where he graduated in 1864. During the remainder of the Civil War he served with the engineer corps of the Army of the Potomac and was brevetted captain on April 2, 1865. Two years afterward he received his commission as captain in the corps of engineers, in 1883 he was promoted major, in 1895 lieutenant colonel, and in 1903 colonel. After the Civil War he was chiefly employed in building fortifications and improving harbors. He explored the Yellowstone National Park in 1871, 10 years afterward was the military representative of the United States at the Paris Congress of Electricians, and was retired in 1905 with the rank of brigadier general. His publications include: *History of the Application of the Electric Light to Lighting the Coasts of France* (1883); *Electrical Appliances of the Present Day* (1884); *Ancient and Modern Lighthouses* (1887).

HEARING (from *hear*, AS. *hyren*, *heran*, Goth. *hausjan*, OHG. *horren*, Ger. *horen*, to hear, connected with Gk. *akouē*, *akouein*, to hear, and possibly ultimately with Eng. *ear*). In its broadest sense, any judicial examination of the issues in a legal proceeding, whether those issues are presented in a formal action at law, in a suit in equity, upon a motion addressed to a court or judge, or upon the appearance of one party only. Specifically, however, the term "hearing" signifies the proceeding in an equity suit, corresponding to a "trial" in an action of law, or to the preliminary examination as to the commission of a crime conducted by a coroner or a committing magistrate. The term is also commonly applied to the sitting of a legislative committee, an official board or commission or other public officer or body, held for the purpose of giving interested parties an opportunity to express their views on any measure or policy then under consideration. The proceedings at hearings, even when of a judicial character, are usually less formal than those of a trial. See TRIAL; PROCEDURE.

HEARING. See AUDITION; EAR.

HEARING IN ANIMALS. Hearing has

been defined as that sense whose adequate stimulus consists of vibrations of a surrounding medium, usually air, but sometimes water or some other substance. This definition is, however, not entirely satisfactory, since man, and presumably lower animals, may respond to a vibratory stimulus when the sense of hearing is absent. (See MECHANICAL SENSE; TOUCH.) We are led, therefore, to posit the sense of hearing in animals only when we find both a specific organ and a specific mode of behavior conditioned upon vibratory stimulation.

In the lowest vertebrates there is no adequate basis for supposing the existence of a sense of hearing. In coelenterates and in crustacea we find organs, called otocysts, which from their structure might be thought to be primitive auditory organs. We do not find, however, any specific form of behavior correlated with the stimulation of these organs; and it has therefore been suggested that they are not auditory in function, but that they have to do with the maintenance of the animal's position in space. Both the annelids (earthworms) and the crustacea sometimes respond to vibratory stimuli, but their reactions in such cases do not differ from their response to other mechanical stimuli. Darwin, e.g., found that earthworms, which did not ordinarily respond to tones, retreated into their burrows when the pots containing them were placed on a piano and a note was struck. Spiders, although no specific organ of hearing has definitely been made out, have been found to react readily to tuning forks; but it seems as if the response takes place only when the web is set into vibration. This limitation alone would not disprove the existence of hearing in spiders, for it might be the case that the more positive transmission of the impulse by a solid body was necessary for its effectiveness. Since, however, the behavior of the animal does not differ from its response to other forms of mechanical stimulation, the assumption of an auditory sense is not justifiable.

Despite popular belief, there is no conclusive evidence of hearing in the insects. Grasshoppers are provided with chordotonal organs, which may function for hearing or, as has been suggested, for a sense intermediate between hearing and general body sensibility. Ants are not dependent upon sound in their complex social activities; and bees, although they produce a number of different noises under varying conditions, have not as yet been shown to respond to noises as such.

Fishes possess structures analogous to the human ear, and many species respond to the vibrations of a tuning fork or of a string apposed to the aquarium. When the auditory nerves are cut, these responses become much less frequent. Fishes also possess lateral line organs, for which "the stimulus (a water vibration of low frequency) is a physical stimulus intermediate in character between that effective for the skin (deforming pressure of solids, currents, etc.) and that for the ear (vibrations of high frequency), and indicates that these organs hold an intermediate place between the two sets of sense organs named."

Among the amphibia frogs have been shown to respond to certain sounds and to inhibit or modify movements as the result of acoustical stimulation. They may be affected by sounds ranging between 50 and 10,000 single vibrations in one second.

There is no doubt that the higher vertebrates, in general, are endowed with the sense of hearing, but the degree and the range of their auditory sensibility have still to be determined. Experimenters have attempted to show that raccoons and cats can discriminate similar articulate sounds; that raccoons discriminate noises better than human beings and have a lower limen for noise; that dogs can not only discriminate an interval of a semitone, but can even distinguish a difference of a half tone in one of the notes of a chord. The experiments upon which these conclusions are based have, however, not been made under strictly controlled conditions, and there is good evidence that many of the apparently finer discriminations made by the animals were based upon such secondary criteria as the various unconscious movements of the experimenter.

For a description of the organs which may mediate hearing in the different animal forms, see EAR, COMPARATIVE ANATOMY OF. Consult, in general, Washburn, *Animal Mind* (New York, 1908); and for the experimental work on mammals, Johnson, *Audition and Habit Formation in the Dog* (ib., 1913).

HEARN, hĕrn, GEORGE ARNOLD (1835-1913). An American merchant and art collector, born in New York City. In 1860 he entered the dry-goods business which his father had established in 1826, and of which he became head on his father's death, in 1886. An enthusiastic art collector, especially of the work of American painters, he presented to the Metropolitan Museum of Art 22 pictures in 1903, 28 pictures and \$100,000 in 1905, 15 pictures in 1909, and still another bequest of pictures and another \$100,000, in memory of his son Arthur Hoppoch Hearn, in 1911. He was a patron also of the Brooklyn Institute of Arts and Sciences. He acquired a private collection of more than 300 paintings, possessed very fine collections of miniatures and ivories, and owned several fine pieces of sculpture. These he bequeathed to his widow.

HEARN, LAFCADIO (1850-1904). A writer on Japan, born in the Ionian Islands, the son of a Greek woman and of an Irish officer, Surgeon Major Charles Hearn. He was educated in England and France, went to the United States at the age of 19, and engaged in journalism, first in Cincinnati, then in New Orleans and New York. After winning a reputation for his powers of picturesque description, he went to Japan in 1891 as a correspondent, but soon gave up his connection with the newspapers, secured an engagement to teach English in the University of Tokyo, and became a citizen of Japan. He married a Japanese wife and devoted his extraordinary gifts of appreciation and criticism to interpreting between the civilizations of the East and the West. The social importance of his work is not yet fully realized; the exquisiteness of his literary art is beyond dispute. He died Sept. 26, 1904. Among his writings are: *Chita: A Memory of Last Island* (1889); *Two Years in French West Indies* (1890); *Youma, the Story of a West Indian Slave* (1890); and, after his going to Japan, *Out of the East* (1894); *Glimpses of Unfamiliar Japan* (1894); *Reveries and Studies in New Japan*, Kokoro, and *Hints and Echoes of Japanese Inner Life* (1896); *Gleanings in Buddha Fields* (1897); *Emotics and Retrospectives* (1898); *Shadowings* (1900); *Kotto* (1902); *In Ghostly Japan*

(1904); *Japan: An Attempt at Interpretation* (1904); *Kwaidan* (1904). Consult: Bisland, *The Life and Letters of Lafcadio Hearn* (Boston, 1906); id., *Japanese Letters of Lafcadio Hearn* (London, 1911); Gould, *Concerning Lafcadio Hearn* (Philadelphia, 1908), with a bibliography by Laura Stedman; Kennard, *Lafcadio Hearn* (London, 1912); P. E. More, *Shelburne Essays* (2d series, New York, 1907); Noguchi, "A Japanese Appreciation of Lafcadio Hearn," in the *Atlantic Monthly* (Boston, 1910); id., *Lafcadio Hearn in Japan* (ib., 1911).

HEARNE, THOMAS (1678-1735). An English antiquary, born at White Waltham, Berkshire, and educated at Oxford, where he passed his life at St. Edmund Hall. He was appointed second keeper of the Bodleian Library in 1712, but lost his post and all hope of university preferment owing to his refusal to swear allegiance to the house of Hanover. He edited Leland's *Itinerary* (1710-12); *Aluredi Annales* (1716); Camden's *Annales* (1717); Robert of Gloucester's *Chronicle* (1724). From 1705 to within a few days of his death he kept an extensive diary. Consult *Reliquiæ Hearnianæ: The Remains of Thomas Hearne* (2d ed., 3 vols., London, 1869).

HEARSAY EVIDENCE. Testimony as to a fact which is given in evidence by one who had no immediate, first-hand knowledge of the fact, but who derived his knowledge from written or oral statements made to him by others or from common report. In the law of evidence as administered in the courts of England and the United States, such evidence is received only under exceptional circumstances, the general rule being that a witness may testify only to occurrences and other facts which have come under his own observation, i.e., have become known to him directly through his own senses. To permit him to repeat in court statements made to him by others would be to receive in evidence reported statements of fact, not themselves given under the solemn sanction of judicial proceedings, under oath, and not subjected to the test of cross-examination.

Other legal systems, like those of the continent of Europe, realizing that much of the knowledge by which men guide their lives, and that many, if not most, of the facts which they unhesitatingly accept as true, are known to them only by hearsay, admit such evidence in their judicial proceedings, leaving it to the tribunal trying the fact, whether judge or jury, to estimate it at its true value. But the distrust of the jury which the common-law courts have always entertained has, in the legal systems of England and the United States, led to the rejection of such evidence, on the assumption that the jury was not competent to weigh its trustworthiness as compared with the direct, first-hand evidence in the case. It may well be doubted whether this judicial distrust of the jury's competence is wholly justified; certainly the rule excluding hearsay shuts out much information that would be helpful to the jury in reaching a verdict on the facts, and there is little reason to believe that the verdicts reached by French or German juries on evidence made up in part of hearsay are less sound and just than those rendered by English and American juries under the more restricted rules by which they are governed. But the hearsay rule is too firmly established in English and American procedure to be shaken by such considera-

tions. The most that is hoped for by the critics of the rule is that the scope of the few excepted classes of cases in which hearsay, or reported, testimony is received, may in the course of time be somewhat enlarged.

It will be noted that the hearsay rule, as it is called, does not bar out all testimony as to words spoken to or in the hearing of the testifying witness. When the words spoken are themselves material facts, as a threat uttered in his hearing, a conversation alleged to embody a contract, or an incendiary speech made in his presence, he may, of course, testify to those facts. In other words, where the question is whether a statement was or was not made by a given person, any competent person who heard it may give it in evidence. It is only where such extrajudicial statement is offered to prove the fact asserted in it that it becomes hearsay. For a statement of the hearsay rule and its exceptions, see EVIDENCE.

HEARSAY RULE. See HEARSAY EVIDENCE; EVIDENCE.

HEARSE, or HERSE (OF. *herce*, Fr. *herse*, from Lat. *hirpca*, harrow). A name now used to designate the conveyance in which a coffin is borne to the grave. The term was formerly applied to a metal grating or spike fence with upright spikes for the reception of candles for illumination and the hanging of decorative draperies around a tomb or at a gateway. Afterward it was used at the ceremonies of the Church and at funeral services. It was very simple in form, but in the fifteenth and sixteenth centuries hearses of great splendor came into use and were erected in the churches over the bodies of distinguished personages. They were often of metal, and the permanent adjunct to tombs. At other tombs they were around the altar. The framework was of wood, iron, or brass, sometimes of beautiful workmanship, square, octagonal, etc., in plan, with pillars at the angles and arched framework above forming a canopy. The whole was hung over with rich cloths and embroidery, banners, and coats of arms, and lighted up with hundreds of wax candles and decorated with wax images. Such hearses were used at public funerals and set up in the streets. They were temporary. From this the transition to the modern funeral hearse can be easily traced. In Roman Catholic churches of the present day the hearse still exists as a triangle with spikes, on which candles are placed.

HEARST, hérst, PHEBE APPERSON (1842-). An American philanthropist, mother of William Randolph Hearst. Her husband was Senator George Hearst, to whom she was married in 1862. She established and for several years supported kindergarten classes in San Francisco, Cal.; for 10 years she maintained a training class for kindergarten teachers in Washington; and later she established kindergarten classes at Lead, S. Dak., where her principal mining interests were located. At Lead and at Anaconda, Mont., she built and at first maintained public libraries; in Washington, D. C., she built the National Cathedral (Episcopal) School for Girls at a cost of \$250,000; and looking towards a comprehensive expansion of the University of California, at Berkeley, she paid the cost of a notable architects' competition. As a memorial to her husband, she erected and equipped the mining building at Berkeley.

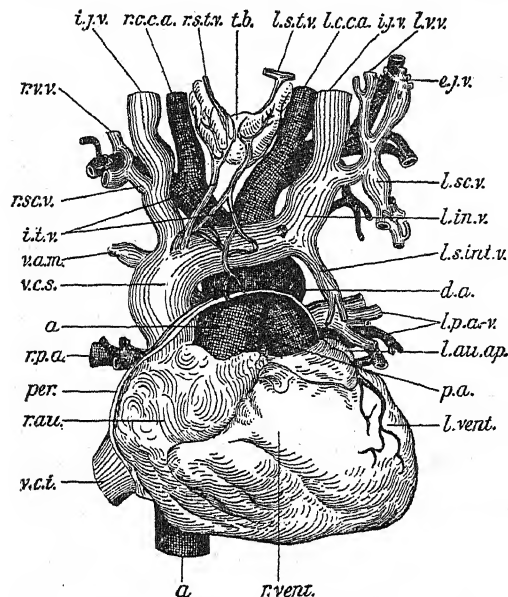
HEARST, WILLIAM HOWARD (1863-).

A Canadian statesman. He was born in Arran Township, Bruce Co., Ontario, and was educated at the Collingwood Collegiate Institute and Toronto University. He was called to the bar in 1888, practiced his profession at Sault Ste. Marie, and was appointed government agent and counsel in connection with the guarantee loan to the Lake Superior Corporation. He resigned in 1908 and was made king's counsel the same year. Though unsuccessful as a Conservative candidate for the Ontario Legislature in 1894, he was elected in 1908. In 1911 he was made Minister of Lands, Forests, and Mines in the administration of Sir J. P. Whitney (q.v.) and after the latter's death in 1914 became Premier of Ontario. He was prominently identified with the development of the resources of northern Ontario.

HEARST, WILLIAM RANDOLPH (1863-). An American journalist and politician, born in San Francisco, a son of Senator George Hearst and Mrs. Phebe Apperson Hearst (q.v.). He was educated at Harvard University and in 1886 was placed in charge of the San Francisco *Examiner* by his father. In 1895 he purchased the New York *Journal*, and later the New York *Advertiser*, and newspapers in Chicago, Los Angeles, and Atlanta, and established the Boston *American*. Under him so-called "yellow journalism" thrived, and the typography of all American newspapers materially changed. He is credited with the invention of the "spread news head." Mr. Hearst advocated the tenets of the most radical wing of the Democratic party. In 1904 he was strongly supported for the presidential nomination in the St. Louis Convention. In 1905 he was the candidate of the Municipal Ownership party for the mayoralty of New York, against George B. McClellan, and failed of election by less than 6000 votes out of half a million. He represented a New York district in Congress from 1903 to 1907. He formed (in 1906) a party of his own, known as the "Independence League," and ran as its candidate for Governor of New York. In 1909, as the nominee of the Independence League for mayor of New York, he failed to secure election; again in 1913 he was prominent during the mayoralty campaign, though not a candidate. He acquired large magazine interests and came into control of a syndicate known as the International News Service.

HEART (AS. *heorte*, Goth. *haurtō*, OILG. *herza*, Ger. *Herz*; connected with Lat. *cor*, Gk. *kardia*, Lith. *szirdis*, OChurch Slav. *sirdice*, Arm. *sirt*, heart; probably connected with Skt. *hrdaya*, Ar. *zardaya*, heart, or with Skt. *śraddhā*, Lat. *credere*, to trust). A muscular organ situated in the thorax, occupying part of the space between the lungs, and acting as a pump for propelling the blood to all parts of the body. It is a four-chambered organ, consisting of two upper parts, the right and left auricles, and two lower parts, the right and left ventricles. This article will be confined to a description of the human heart. It is cone-shaped and flattened and in the adult lies obliquely behind the lower two-thirds of the sternum, projecting considerably to the left. Its base is upward and directed somewhat backward and is situated practically at the level of the third intercostal space. Its apex is directed to the left, downward and forward, and reaches the space between the fifth and sixth costal cartilages. The heart is so tilted that the margin of its right ventricle lies upon the central tendon of the

diaphragm. The adult heart is about 5 inches from base to apex, by $3\frac{1}{2}$ inches across the base, by $2\frac{1}{2}$ inches thick. Its weight is, in the male 11 ounces, and in the female about 9 ounces; its weight gradually increasing up to



ANTERIOR VIEW OF THE HEART WITH THE LARGER BLOOD VESSELS.

i.j.v., internal jugular veins; *r.c.c.a.*, right common carotid artery; *r.s.t.v.*, right superior thyroid veins; *r.v.v.*, right vertebral vein; *r.s.c.v.*, right subclavian vein; *i.t.v.*, inferior thyroid vein; *v.a.m.*, vena azygos major; *v.c.s.*, vena cava superior; *a.*, aorta; *r.p.a.*, right pulmonary artery; *per.*, cut edge of pericardium; *r.au.*, right auricle; *v.c.i.*, vena cava inferior; *r.vent.*, right ventricle; *t.b.*, thyroid body; *i.s.t.v.*, left superior thyroid vein; *i.c.c.a.*, left common carotid artery; *i.s.v.*, left vertebral vein; *e.j.v.*, external jugular vein; *i.s.c.v.*, left subclavian vein; *i.in.v.*, left innominate vein; *i.s.int.v.*, left superior intercostal vein; *d.a.*, ductus arteriosus; *i.p.a.v.*, left pulmonary artery and vein; *l.au.ap.*, left auricular appendix; *p.a.*, left pulmonary artery; *l.vent.*, left ventricle.

middle life, and then growing less as age advances.

The right auricle receives the venous blood from the venæ cavæ and empties it into the right ventricle. The auricle presents a central cavity or sinus of nearly quadrangular shape and a small appendix somewhat resembling a dog's ear and called the auricular appendix. The walls of the auricle are composed of two layers of muscular fibre and are very thin. The left auricle resembles its fellow of the right side. It receives the blood from the lungs through the four pulmonary veins, which empty, without valves, by four distinct openings. It opens into the corresponding ventricle by means of the left auriculo-ventricular orifice. Each auricle holds within its cavity, moderately distended, about two ounces of fluid. The ventricles, which constitute the bulk of the heart, are characterized by the great thickness of their walls and their large capacity relatively to the auricles. The cavity of each ventricle is conoidal, that of the right being broader and shorter and a trifle more capacious than that of the left. Prominent muscular ridges and papillæ, the *columnæ carneæ*, arise from the inner surface of each ventricle, and from them the *chordæ tendineæ*, fibrous cords, pass to the free border of the valves which close the openings between auri-

cles and ventricles. There are four valves in the heart. The mitral valve closes the left auriculo-ventricular opening and consists of two segments. When these are closed together, the blood is prevented from regurgitating from the left ventricle into the left auricle. The tricuspid valve, situated in the right ventricle, closes the right auriculo-ventricular opening. It consists of three segments, each triangular in shape and adherent to each other at the portion of their free margins which is nearest the fibrous ring from which they arise. The largest of the segments is nearest the pulmonary artery. The semilunar valves are found at the aortic and pulmonary orifices of the heart. The aorta (q.v.) springs from the left ventricle, and through it passes the blood to the arterial system. The pulmonary artery springs from the right ventricle, and through it blood passes to the lungs. The closure of the flaps of the semilunar valves prevents regurgitation of the blood into the aorta and pulmonary artery when the heart expands during the diastole. These valves are well supplied with fibrous material and possess great rigidity, so that they retain their shape. They open out of the ventricles and not in their cavities.

The heart receives its nourishment from blood conveyed to it by the coronary arteries during the diastole of the heart. The veins of the heart accompany the arteries and return their blood into the cavity of the right auricle. The nerves of the heart run into the *deep* and *superficial cardiac plexuses* and also the *posterior* and *anterior coronary plexuses*. These plexuses are formed by sympathetic nerve fibres and by filaments from certain cranial nerves. The heart and the roots of the great vessels are enveloped in the pericardium (q.v.), a sac of conical shape with base below lined with serous membrane (which is reflected over the heart) and containing a very small amount of fluid.

The contraction of the heart, which occurs in the adult from 70 to 80 times a minute, begins in the auricles, which empty their blood into the ventricles. The ventricles then contract—the left to empty itself through the aorta, the right to empty itself through the pulmonary artery. The mitral valve in the left heart prevents regurgitation of blood into the right auricle, and the tricuspid valve in the right heart prevents a like accident in the case of the left auricle. The semilunar valves, as stated, prevent regurgitation at the end of the contraction, or systole. The diastole, or expansion, of the heart begins at once, and the auricles dilate—the right one receiving blood from the two venæ cavæ, which carry venous blood from the upper and lower parts of the body; the left one receiving arterial blood from the lungs through the four pulmonary veins. The ventricles then expand, and the blood passes through the auriculo-ventricular orifices from the auricles until they are full, and the diastole is then complete. (See CIRCULATION.) Previous to birth the circulation in the infant differs, because of structural differences. See FŒTUS; EMBRYO.

Sounds of the Heart. On applying the ear to the cardiac region of a living man or mammal, in a state of health, two successive sounds are heard, each pair of which corresponds with one pulsation. These are known as the *first* and *second* sound. The *first* sound is dull and prolonged, while the *second* is short and sharp,

and the difference between them is well expressed by articulating syllables, lubb, düp. The first sound continues during three-tenths of the pulsation, then follows the "short pause" lasting one-tenth, next the second sound lasting two-tenths, lastly the "long pause" lasting four-tenths.

The cause of the first of these sounds has been a subject of much discussion. During the first sound several distinct actions are taking place to which it is ascribed by physiologists.

carditis, etc. Consult Kirkes, *Physiology* (New York, 1907), and Cunningham, *Textbook of Anatomy* (ib., 1913).

HEART, DISEASES OF THE. Heart disease is a term including many affections of the organ as well as disturbances in its action due to disease elsewhere. Galen was the first to write of disease of the heart, which Hippocrates had denied, though to Vesalius is due the credit of accurate and intelligent grasp of the subject. The discovery of the circulation of the blood by

Harvey in 1628 led the way for the investigations which, nearly a century later, gave clinicians absolute knowledge of certain affections of the heart. Vieussens, Lancisi, Morgagni, Sénac, and Auenbrugger deserve mention in the history of this subject. Laënnec, who in 1819 added the method of auscultation to that of percussion, advanced by his teacher Corvisart, and who invented the stethoscope, opened the field to all explorers. Richard Bright detected the enlargement of the organ which accompanies Bright's disease of the kidneys. Kreyzig and Bouilland recognized endocarditis. Virchow in 1856 elucidated thrombosis and embolism.

Diseases of the heart are either (1) functional or (2) organic. In functional diseases there is no discoverable alteration in structure, and the disorder of function is due to nervous influences. In organic diseases structural alteration is present.

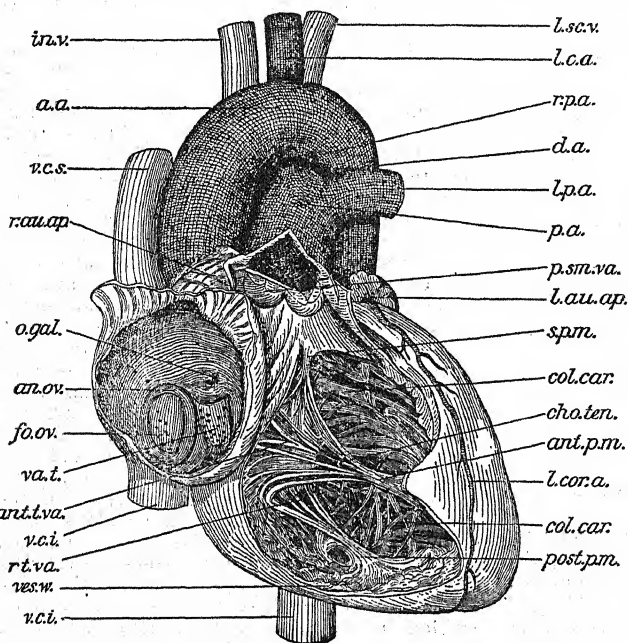
FUNCTIONAL HEART DISEASES

These include disorders in the beating of the heart and in the nature of its contractions as well as neuralgic pains in the heart. Palpitation is the term given to a rapid and more or less distressing beating of the heart, in which the pulse may be accelerated from the normal 70 to 80 beats a minute to 150 or more a minute. This condition may be due to organic disease, or it may be due to emotional

disturbance (as fright or embarrassment), or to excessive physical strain, or to indigestion, with a production of gas and toxins, or to nervous disorder such as neurasthenia, or to tobacco, tea, coffee, alcohol, or certain drugs, or to hemorrhage, or to certain diseases, such as Basedow's disease (q.v.). Generally nervous excitability, apprehension, shortness of breath, increased perspiration, and flushing of the face accompany palpitation. Acute pain in the heart is experienced by some patients during attacks of hysteria, e.g.; neuralgia of that organ also occurs. Cardiac pain also accompanies fermentative dyspepsia. Disease of the coronary arteries causes, it is believed, the exquisitely painful angina pectoris (q.v.).

ORGANIC DISEASES

Besides angina pectoris, these include pericarditis, endocarditis, myocarditis, hypertrophy, dilatation, embolism, aneurism, and degenera-



ANTERIOR VIEW OF THE RIGHT CHAMBERS OF THE HEART, WITH THE GREAT VESSELS.

inn. v., innominate vein; a. a., arch of aorta; v. c. s., vena cava superior; r. a. u. ap., right auricular appendix; o. gal., orifice of vein of Galen; an. o. v., annulus ovalis; f. o. v., fossa ovalis; v. a. i., valve of Thebesius; ant. t. v. a., anterior segment of tricuspid valve; v. c. i., vena cava inferior; r. t. v. a., right segment of tricuspid valve; ven. w., section of ventricular wall; l. s. v., left subclavian vein; l. c. a., left carotid artery; r. p. a., right pulmonary artery; d. a., ductus arteriosus; l. p. a., left pulmonary artery; p. a., pulmonary artery; p. s. m. v., pulmonary semilunar valves; l. a. u. ap., left auricular appendix; s. p. m., small papillary muscle connected with septum; col. car., columnae carnae; cho. ten., chordae tendineae; ant. p. m., anterior papillary muscle; l. cor. a., left coronary artery; post. p. m., posterior papillary muscle.

Thus, we have (1) the impulse of the apex of the heart against the side of the chest, producing the "apex beat"; (2) the contraction of the muscular walls of the ventricles; (3) the tension of the auriculo-ventricular (tricuspid and mitral) valves and of the chordae tendineae. (See CIRCULATION.) The second sound is caused by the sudden closure of the valves of the aorta and of the pulmonary artery as the currents of blood reverse at the instant the heart relaxes and begins to dilate.

When the valves are changed by disease, the sounds undergo special alterations, which are of the highest importance in diagnosis. The normal sounds may be intensified or weakened, or they may disappear entirely and be replaced by murmurs; or abnormal sounds may be heard simultaneously with, or in the intervals between, the normal ones. Thus, we find murmurs of regurgitation in valvular insufficiency, murmurs of obstructed flow of blood in valvular stenosis, aneurismal murmurs, friction sounds in peri-

tive changes without inflammation. More than one disease may be found coexisting, and both functional and organic diseases may be present together.

Pericarditis is an inflammatory disease in which the pericardium is thickened and roughened. See PERICARDITIS.

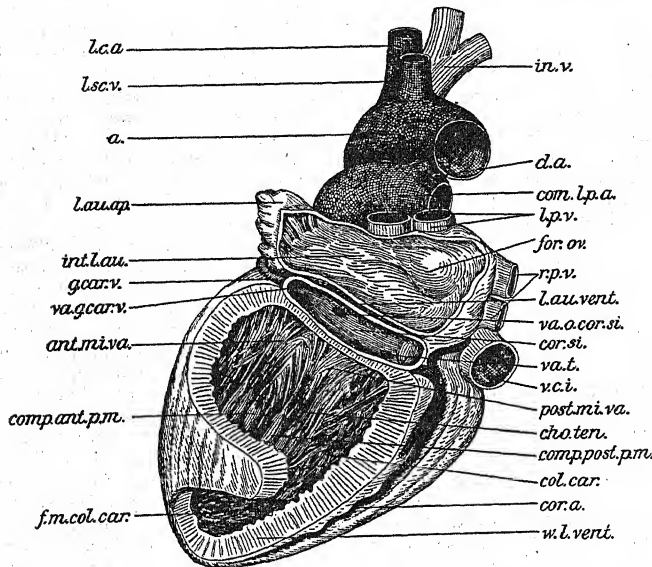
Degenerative Changes in the Heart Muscle. Parenchymatous degeneration, or cloudy swelling, as it is often called, is the form of degeneration which usually accompanies the infectious diseases such as diphtheria or typhoid fever. The heart walls are somewhat softer than normal and rather paler in color. The changes in the heart muscle cells are quite similar to the changes of parenchymatous degeneration in the cells of other organs. (See DEGENERATION.) The heart cells become gradually more granular, and in proportion to the extent of the granula-

tirely to destroy the normal appearance of the tissue. What is known as "fatty infiltration of the heart" is not a lesion of the heart muscle itself, but consists in an accumulation of fat beneath the pericardium and in the connective tissue between the muscle fibres. The amount of fat may be very large, causing atrophy of the muscle tissue and interfering with the functions of the organ.

Myocarditis. This is an inflammation occurring in the middle or muscular layer of the heart walls and involving also the blood vessels and interstitial connective tissue. The acute form is frequently suppurative in character and occurs as an extension from an ulcerative endocarditis or pericarditis, or as a complication of one of the infectious diseases. It may be diffuse or, as is more commonly the case, circumscribed with the formation of abscesses. In the chronic

form of myocarditis the lesion consists in an increase in the connective tissue elements of the heart, with more or less atrophy of the muscular elements. The condition is usually associated with lesions of the coronary arteries. Opinions differ as to the primary lesion, some holding that the atrophy of the heart muscle is dependent upon the increase in connective tissue, a true productive inflammation; others, that the degeneration of the heart muscle occurs first, the connective tissue proliferation being of the nature of a replacement hyperplasia. Syphilitic myocarditis and tubercular myocarditis sometimes occur. Myocarditis may give rise to few or no symptoms.

Endocarditis. The lesion in endocarditis is an inflammation of the endocardium, or lining membrane of the heart. While any portion of this membrane may be involved, it is common for the inflammation to be confined to that part of it which covers the valves of the heart and to result in an impairment of their efficiency. For this reason it is often referred to as "valvular heart disease," or "valvular endocarditis." *Simple acute endocarditis* is a frequent complication of rheumatism. It may also be caused by some of the acute infectious diseases, especially scarlet fever and pneumonia. There may be simply thickening of the valves of the heart, their surfaces remaining smooth; or the valves may be rough and either eroded or studded with new growths, called vegetations, which give them a warty appearance. Microscopically the vegetations are seen to be made up of granulation tissue, covered on the surface with a layer of fibrin. There is usually more or less proliferation of the cells in the subendothelial connective tissue. *Malignant* or *ulcerative endocarditis* is due to the action of bacteria. The streptococcus and staphylococcus pyogenes are the most common incitants. More rarely the pneumococcus, the gonococcus, or the bacilli of anthrax, tuberculosis, or typhoid fever are present. The con-



POSTERIOR VIEW OF THE LEFT CHAMBER OF THE HEART, WITH THE GREAT BLOOD VESSELS AND CORONARY SINUS LAID BARE.

l.c.a., left carotid artery; *l.s.c.v.*, left subclavian vein; *a.*, aorta; *l.a.u.ap.*, left auricular appendix; *int.l.a.u.*, interior of left auricle; *g.c.a.v.*, great cardiac vein; *v.g.c.a.v.*, valve of great cardiac vein; *ant.mi.va.*, anterior segment of mitral valve; *comp.ant.p.m.*, compound anterior papillary muscle; *f.m.col.car.*, fine meshwork of columnæ carneæ at the apex of ventricle; *in.v.*, innominate vein; *d.a.*, ductus arteriosus; *com.l.p.a.*, commencement of left pulmonary artery; *l.p.v.*, left pulmonary veins; *for.ov.*, concave edge of the foramen ovale; *r.p.v.*, right pulmonary veins; *l.a.u.vent.*, left auriculo-ventricular opening; *v.a.c.or.si.*, valve orifice of vein in coronary sinus; *cor.si.*, coronary sinus; *v.a.t.*, valve of Thebesius; *v.c.i.*, vena cava inferior; *post.mi.va.*, posterior segment of mitral valve; *cho.ten.*, chordæ tendineæ; *comp.post.p.m.*, compound posterior papillary muscle; *col.car.*, columnæ carneæ; *cor.a.*, coronary artery; *u.l.vent.*, section through wall of left ventricle.

tion lose part or all of their normal striated appearance. "Hyaline," "amyloid," and "calcareous" degeneration may occur in heart muscle. *Fatty degeneration* of the heart muscle is a quite common lesion. Its causes are anæmia, old age, wasting diseases, prolonged infectious fevers, certain poisons, such as phosphorus, etc. It consists in the replacement of the heart muscle cell protoplasm by, or its transformation into, fat to a greater or less extent. The degeneration is often not distributed uniformly throughout the heart muscle, but occurs in patches. The degenerated muscle looks pale in color and is softer than normal. The fat droplets within the cells may be large or small, may be few in number or in such numbers as en-

dition may be either primary or, more frequently, it may exist as a complication of one of the infectious diseases. The valves of the heart may be covered with vegetations, or there may be suppuration or necrosis with destruction of tissue. The vegetations consist of granulation tissue covered with fibrin and containing many microorganisms. It is most common on the mitral and aortic valves. More rarely, instead of occurring on the valves, it involves the walls of the heart, when it may lead to perforation either of a septum or of the external wall itself. Detachment of bits of the vegetations or necrotic tissue is not uncommon. Entering the circulation, they form infectious emboli, setting up foci of infection in distant parts of the body. *Chronic endocarditis*, the usual forerunner of valvular diseases of the heart, consists in sclerosis of one or more of the valves of the heart. The sclerosis may be primary, but is usually secondary, to the acute form of the disease. In this, again, the cause is primarily in most cases rheumatism; gout, syphilis, alcoholism, and Bright's disease are also important etiological factors. A common cause, especially in the case of the aortic valve, is constant and excessive muscular exertion. There may be small vegetations on the valves representing remains of acute inflammation. The valves are thickened, opaque, and shrunken. This shrinkage produces deformity; the edges become curled so that the valve is incapable of perfect closure. In this way the valve may become insufficient without any degree of stenosis (narrowing of the opening), or, as the process goes on and the thickening becomes greater, the stenosis may be marked. In the later stages of the disease lime salts are frequently deposited in the new connective tissue of the valves, forming a dense mass of calcareous tissue. Chronic endocarditis may affect the walls of the heart, forming patches of fibrous tissue. Tuberculous endocarditis sometimes occurs.

Endocarditis, whether due to rheumatic inflammation (and the heart complication is said to occur in over 40 per cent of the cases of rheumatism) or whether due to other causes, produces difficulty with the action of the valves of the heart. The thickening of the cusps or flaps of the valves, due to deposits between the layers of endocardium which cover them, makes them stiff and unyielding. They may obstruct the flow of blood through them, causing *stenosis*. The valve flaps may become shortened from contraction of the fibrous structure newly developed and allow the blood to flow back through the valves when they are tightly shut, causing *regurgitation*. Alteration of the normal heart sounds reveals to the trained ear information which will determine the condition. (See *Sounds of the Heart*, in the article HEART.) A rough surface on the valve flaps may lead to a deposit of fibrin from the blood and the formation of a thrombus (q.v.). A thrombus, or a vegetation (a fringe or small lump of granulation tissue), may become broken off and be carried up into an artery of the brain, plugging it, with dire results. Such a plug is called an *embolus*, and the occurrence is termed *embolism* (q.v.). The result of embolism of a cerebral artery may be immediate death, paralysis, convulsions, or secondary softening, with consequent mental deterioration in course of time. Chronic endocarditis may exist for a considerable length of time without causing any

symptoms; the heart becoming hypertrophied in one or another of its parts, and being thus enabled to meet the extra amount of work that is thrown upon it by the valvular stenosis or insufficiency. Sooner or later, however, the disease causes the appearance of symptoms, of which the most characteristic are shortness of breath, hemorrhage from the lungs, blueness of the lips and finger nails, dropsy of the hands and feet, dyspepsia, headaches, vertigo, and fainting spells. The prognosis depends upon the particular valve affected, the existence or non-existence of compensatory hypertrophy, the age of the patient, etc.

Hypertrophy of the Heart. This consists in thickening of the heart walls, the cavity of the heart remaining of normal size (*simple hypertrophy*), contracting (*concentric hypertrophy*), or dilating (*eccentric hypertrophy*). The muscle tissue in hypertrophy of the heart is enlarged, probably both by increase in the number of fibres and by increase in size of the individual fibres. The hypertrophied muscle is dense, firm, and dark in color. If the hypertrophy affects both ventricles, there is an increase in both length and breadth of the heart. If the left ventricle alone is affected, there is an increase in the length of the heart, while hypertrophy of the right ventricle broadens the heart on the right side. Hypertrophied hearts may weigh from two to three pounds or more. Dilatation of the heart may, as already mentioned, be associated with hypertrophy. This is known as active dilatation. Or dilatation may occur with thinning of the heart walls, which is known as passive dilatation. The dilatation may affect any one or all of the cavities. The right side of the heart is more frequently affected than the left side.

Dilatation with compensating hypertrophy, if the valves of the heart are competent, is of little moment. The heart is the stronger for the hypertrophy. Mountain climbing may cause it, as well as mental emotion with oft-repeated increase of the heart's action, or obstacle to the circulation. When the heart has become enlarged as a sequel of kidney disease, it is the latter that causes death when it comes. The ventricles are far more often dilated than the auricles, though all four cavities may be dilated. Should the hypertrophied heart become fatty, a grave danger arises; progressive cardiac failure may occur, with weakening of the circulation and dropsy of the lower extremities.

Heart Block, also known as the Stokes-Adams syndrome, is a disease characterized by partial or complete dissociation of the contractions of the auricles and the ventricles of the heart. It manifests itself in slowness of the pulse (40 to 30 beats per minute) and periodic fainting attacks. Secondary symptoms may be digestive disturbances, nausea or vomiting, and respiratory difficulties, dyspnoea, and sometimes Cheyne-Stokes respiration (q.v.). There are two theories as to the origin of heart contractions. According to the myogenic theory they are originated in and maintained by the muscle fibres themselves. According to the neurogenic theory the heart contracts only in response to stimulation by the cardiac ganglia and the central nervous system. The cause of heart block is believed, by followers of the myogenic theory, to be a destructive lesion of the bundle of His, or Gaskell's bridge, a bundle of muscle fibres about 18 millimeters long, 2.5 millimeters broad, and

1.5 millimeters thick, situated in the intraventricular septum, by which the impulse initiating the contraction of the heart is conveyed from the auricle to the ventricle. Those who favor the second theory seek the cause of heart block in lesions of the pons or medulla, affecting the respiratory and cardio-inhibitory centres. Among the pathologic findings in cases of heart block may be mentioned gumma, syphilitic ulcer or scar, arteriosclerosis with a calcareous nodule compressing the bundle of His, anæmic degeneration, abscess and ulcer of pyogenic origin, tumors and infarcts.

In the main heart diseases are rare, and they are an infrequent cause of death. One with valvular trouble of a mild degree may fulfill the ordinary expectation of life, if he is content to live on a level, avoiding violent exercise, running or lifting, and avoiding anger, grief, and general emotional conditions. Cases of sudden death, called death from heart disease, are often due to cerebral embolism.

Aneurism of the Heart is very rare. It is always fatal. Consult: Strümpell, *Text-Book of Medicine* (New York, 1905); Osler, *Practice of Medicine* (ib., 1912); Satterthwaite, *Cardiovascular Diseases* (ib., 1913); Cowan, *Diseases of the Heart* (London, 1914).

HEART BURIAL. See BURIAL.

HEART LYMPH. See CIRCULATORY SYSTEM, EVOLUTION OF.

HEART OF ENGLAND. A name applied to Warwickshire, as the middle county of England.

HEART OF MIDLOTHIAN, mid-lō'thī-an. One of Scott's *Tales of my Landlord* (1818).

HEARTS. A game of cards, most frequently played by four persons. The whole pack is ordinarily dealt, in succession, one to each of the four, until each player has 13 cards. The first player to the left of the dealer plays any card he likes, the rest following suit, if possible. The highest card of the suit played wins the trick. If the player cannot follow suit, he may play any card he pleases, and, when hearts are not led, he has the opportunity of getting rid of them. The winner of the first trick leads for the second; and so on until all the 13 tricks have been taken. Then the players in turn expose their hands, count the number of the hearts, and pay into the pool one chip or unit for each one they have, and the pool is divided as provided for under the rules, or it remains, under some circumstances, as an added stake for the next hand. But if the settling is according to Hoyle's rule, each player also pays in addition as many other chips as there are other players (in every four-handed game there are, of course, three other players, and a player who has two hearts has to pay six chips, and so on all round). There will always, therefore, be 39 chips in the pool. Then each player draws out of the pool one chip for every heart *not* taken by him in the play. Thus, if one player has not taken any hearts, he draws 13 chips. The man who has taken 3 hearts takes 10 chips, he who has taken 4 hearts takes 9 chips, and he who has taken 6 hearts takes 7 chips. This exhausts the pool. It is impossible to discuss in detail the reasons which will operate in a player's mind in the various heart games. "Progressive hearts" is played after the manner of progressive euchre, so far as the arrangement of players, tables, and scoring is concerned. In the double, or *eagle*, game each player gives

for an ace, 14; a king, 13; a queen, 12; a knave, 11; and for each of the other cards the equivalent of the spots they stand for. This is instead of paying the pool one chip for each heart taken. It may also be played so that the ace counts 5; queen, 3; knave, 2; and all other cards 1. In a variation of the regular game common in the United States, one of the black queens, usually the queen of spades, and called the "Lizzie," or "black lady," is given the value of 13, and must be played in suit. The effort, therefore, is to get rid of this card. Other variations of the game include "six-handed hearts," "three-handed," "sweepstake," "auction," "spot," "drive," "joker," and "jack pot." Consult *Foster's Complete Hoyle* (New York, 1909).

HEART'S CONTENT. A port of Newfoundland on the east side of Trinity Bay (Map: Newfoundland, G 5). It is an excellent harbor and noted as the landing place of three Atlantic telegraph cables from Valentia, Ireland. Pop., 1901, 1079; 1911, 1017.

HEARTSEASE. See VIOLET.

HEART URCHIN. See ECHINOIDEA.

HEAT (AS. *hæu*, OHG. *heiz*, heat; connected with AS. *hit*, Icel. *hit*, Goth. *heito*, OHG. *hiesza*, Ger. *Hitze*, heat, and AS. *hāt*, Icel. *heitr*, OHG. *heiz*, Ger. *heiss*, Eng. *hot*). A definite sensation, known as "warmth" is felt when one places his hand near a flame, exposes it to the sun, rubs it with the other hand, etc. A different sensation is experienced when the hand is placed on a block of ice or is when wet exposed to a draft of air, etc. These sensations are due to two sets of nerves which correspond to the "temperature" sensations. If natural objects are exposed to conditions similar to those just described, it is observed that they undergo certain changes; in fact, as a rule, all of their physical properties excepting inertia and weight are affected—their size, shape, state, electrical and magnetic properties, elasticity, etc. These changes, when produced in this manner, are called "heat effects."

From the time of the Greek philosophers Epicurus and Democritus until about 1800, heat effects were believed to be due to the addition of a substance to the body experiencing the effects; or, in other words, heat was considered a form of matter. Such an idea was furthered when Professor Stahl (1660-1734), of the University of Halle, announced the theory of "phlogiston," which was represented as a material substance emitted from a burning body. That the theory of the material nature of heat, which in this form was called caloric, was generally accepted in the eighteenth century, is shown by the fact that prizes of the French Academy of Science, offered in 1738 for essays on the nature of heat, were granted to scientists who took this view of the question. Although the material idea of heat prevailed during the seventeenth and eighteenth centuries, it must be mentioned that, by some physicists of those and earlier times, it was considered as a mode of motion in some form or other, just as a few philosophers at different times believed in the undulatory theory of light and in a crude way formulated their ideas. Such men as Descartes, Amontons, Boyle, Francis Bacon, Hooke, and Newton believed that heat must be due to motion of the substance, but could not substantiate their theories by experimental proof or urge them with such force as to secure their

adoption. At a time when experimental knowledge was exceedingly limited, that these men should have arrived at such results by pure reasoning is a matter of great wonder, and if they had continued and verified their theories by actual experiments it is safe to assume that the dynamical theory would have been established on a definite basis far earlier.

Caloric, according to the eighteenth-century physicists, was a fluid of an elastic and self-repellent nature, which permeated all matter. The various heat effects were very plausibly explained on this basis, and it was a long time before the theory was overthrown. The first serious opposition came from Count Rumford (1753-1814), whose experiments on the production of heat by friction were published in 1798. These led him to believe that heat, instead of being a material substance, was merely motion. In fact, in 1804 he wrote to Pictet: "I am satisfied that I shall live a sufficiently long time to have the satisfaction of seeing caloric interred with phlogiston in the same tomb." Experiments by Humphry Davy (1778-1829), in which two pieces of ice were melted by friction, caused him also to think that heat was merely the vibration of the corpuscles of the body. In 1812 he asserted that the immediate cause of the phenomenon of heat is motion, and "the laws of its communication are precisely the same as the laws of the communication of motion." Rumford and Davy were also assisted by Thomas Young (1773-1829) in their attempts to displace the theory of caloric; but, in spite of their efforts, the old theory continued to be accepted for many years, and, in fact, Sadi Carnot (1796-1832) in his famous treatise, *Réflexions sur la puissance motrice de feu*, reasoned on this basis, although later he became finally convinced of the truth of the dynamical theory. It is to the experiments of Joule, however, that we owe the most complete evidence in favor of the idea that heat effects are due to energy. (It should be borne in mind that no experiments can *prove* this relation between cause and effect; they can simply be shown to be in accord with theory.) The modern theory that heat effects are due to energy alone is founded largely on the work of Carnot and Mayer. See THERMODYNAMICS.

The researches on heat are more or less closely connected with the development of the thermometer first made and used by Galileo (1564-1642), as described under THERMOMETER. There was also the stimulus of the invention of the steam engine, and from the time of the construction of the first practical steam engine (1711) many of the inventors who improved that machine carried on investigations in heat. Joseph Black (1728-99), who was among the foremost of these, was an assistant of James Watt, the great Scottish inventor, and later a professor of chemistry at Edinburgh. He derived the idea of latent and specific heats and was the first to use proper methods for calorimetry (q.v.); Lavoisier (1743-94) and Laplace (1749-1827) working along lines somewhat similar, determined specific heats of a number of substances and devised calorimeters.

Nature of Heat Effects. One of the simplest modes of producing heat effects is by means of friction. If two pieces of ice are rubbed together, they will melt; if two pieces of metal are rubbed violently, their temperature rises—as detected by the "temperature sense"—they also

increase in volume; if a paddle is turned rapidly enough in a vessel of water, the water will boil. It requires work to produce friction; and the energy thus lost by the agency doing the work is gained by the bodies on which the work is done and which manifest the heat effects. Similarly, in every known case, if such heat effects as rise in temperature, expansion, boiling, melting, etc., are produced by any external agency, the latter can be proved to have lost energy; and the "amount of the heat effect" is proportional to the energy received. If, on the other hand, a body experiences the reverse changes, such as fall in temperature, contraction, condensation, freezing, etc., it may be proved that it loses energy. This energy which the body gains or loses is not kinetic energy of the whole body or of its visible parts, nor potential energy of strains of the entire body; it is energy associated with the minute portions of the body—its molecules and atoms. The energy of the body considered by itself—omitting any kinetic and potential energy of the whole body that it may have—is called its "intrinsic" energy. This energy of the molecules and atoms is partly the kinetic energy of their irregular motions and vibrations, and partly potential energy in case it requires work to change their relative positions. In ordinary language a flame is called a "source of heat"; when a body is brought near, it is said to receive "heat," and the effects produced are said to be due to heat. These expressions are most unscientific and misleading. A flame is a source of energy; when a body is brought near, energy passes from the flame to it; part of this energy is spent in increasing the intrinsic energy of the body, and part in enabling the body to do external work; e.g., if it expands it pushes back the atmosphere or whatever rests against it, thus doing work. It is proper to speak of the energy which the body receives as "heat energy"; and in accordance with the conservation of energy one may say that "heat energy received" = "increase in intrinsic energy" + "external work done." One can speak of the intrinsic energy in a body (although no idea can be formed of its amount or even nature); but it is as improper to speak of the amount of "heat" in a body as it is to refer to the amount of sound in a horn or the amount of light in a candle.

Energy of a Gas. One of the most important facts in regard to a gas is that, if it is allowed to expand under such conditions that it does no external work, there is no sensible change of temperature, showing that it has required no work to separate the molecules, and that the molecules themselves have not lost energy. In other words, there are no sensible forces either of attraction or of repulsion between the molecules of a gas, and so the energy of the molecules is entirely kinetic. This fact was first shown by Gay-Lussac and later by Joule; and, although the more elaborate experiments of Thomson and Joule showed that there were minute changes in temperature when a gas expanded freely, they indicate that the molecular forces are extremely small. If a gas is allowed to expand in such a manner as to do external work, the energy required for the work is taken from the kinetic energy of the molecules; a fall in temperature is always observed under these conditions when external work is done; and therefore the temperature of a gas depends upon the kinetic energy of its molecules.

Temperature. The units to be used in the measurement of the quantities involved in heat effects are in most cases self-evident: the "heat energy" itself should be expressed in ergs or joules (q.v.); changes in volume, in cubic centimeters; melting or boiling, in number of grams experiencing the change, etc. The difficulty comes in giving a numerical value to "temperature." Primarily this is a question of sensation; and although our senses give us a rough idea as to hot and cold bodies, they do not enable us to give numbers to the property of these bodies which corresponds to these sensations. Recourse must be had to the changes which some natural object undergoes under the conditions when the senses recognize differences in temperature, changes which may be measured. One of the simplest of these changes is alteration in volume. Two standard thermal states must be chosen arbitrarily, e.g., the thermal state of a mixture of pure water and ice at normal barometric pressure, and that of the vapor rising from pure water boiling under normal barometric pressure, because experiments have shown that these conditions are perfectly definite and unvarying. Let v_1 and v_2 be the volumes of any definite body, e.g., a piece of iron or nitrogen gas initially at a certain density, under two thermal conditions, assuming no other changes in external conditions and particularly no change in the pressure on the body. Let v be the volume of the selected body under the thermal condition for which a numerical value is desired, e.g., a vessel of water, the air of a room. Let it be agreed to take n "degrees," or steps, between the two standard thermal

states; then $\frac{v_2 - v_1}{n}$ is the change in volume corresponding to one degree; and the number of degrees corresponding to the change in volume $v - v_1$ is

$$\frac{v - v_1}{v_2 - v_1}, \text{ or } n \frac{v - v_1}{v_2 - v_1}.$$

Therefore, if it is agreed to give the number t_1 to the first thermal state, the proper number for the temperature of the state to which the volume v corresponds is

$$t = t_1 + n \frac{v - v_1}{v_2 - v_1}.$$

In this method for giving a numerical value to the temperature the following steps are arbitrary: (1) choice of property of body, which varies with the temperature; (2) choice of body to serve as "thermometric substance"; (3) choice of two standard thermal states; (4) choice of number of degrees between the temperatures of these states; (5) choice of number for first state. There are, consequently, an indefinite number of methods for giving numerical values to temperature. (See THERMOMETRY.) The scientific world has agreed to use numbers depending upon the change in volume or pressure of hydrogen gas initially at a pressure of 100 centimeters of mercury, the standard thermal states being those of melting ice and vapor rising from boiling water under normal atmospheric pressure, the number of degrees between the temperatures of these states being taken as 100 and the temperature of melting ice being taken as 0. (Therefore the temperature of the other standard state is 100.) Then, in

the above formula, the numerical value of t becomes

$$t = 100 \frac{v - v_0}{v_{100} - v_0}.$$

This is, then, the temperature on a constant-pressure hydrogen thermometer, Centigrade scale.

[If change in pressure of a gas kept at constant volume is the property measured, the temperature is

$$t = 100 \frac{p - p_0}{p_{100} - p_0},$$

where p_0 , p_{100} , p are the pressures of the gas at 0° , 100° , t° . Experiments show that using hydrogen the temperature defined this way has the same numerical value as that defined by the change at constant pressure.]

It is seen, then, that in order to give a numerical value to a thermal state, e.g., to that of water in a vessel, three measurements are necessary—those of the volume of the hydrogen when the bulb containing it is immersed in melting ice (v_0), in vapor rising from the boiling water (v_{100}), and in the water (v). The fact should be emphasized that temperature is not "measured" in the proper sense—the volume is measured; we have simply defined a method for giving a number to temperature. In ordinary laboratory practice mercury-in-glass thermometers are used; and divisions with numbers are marked on them, which are designed to correspond to proportionate increases in volume. These numbers have no meaning until the instrument is compared with a hydrogen thermometer; and a table of values connecting the numbers and the true temperatures—as defined above—is prepared. See THERMOMETER.

Mechanical Equivalent of Heat. Since in practice heat effects are rarely produced by mechanical work, the erg is not a convenient unit in terms of which to measure heat energy. Almost invariably the energy required to produce a given heat effect or the energy given out when the opposite effect occurs, is measured in terms of the change in temperature of water: thus, to find how much energy is required to make ice melt, a quantity of ice of known mass is put into a known mass of water at a known temperature, and the fall in temperature is observed. Therefore a practical unit for the measurement of heat energy is the "energy required to raise the temperature of one gram of pure water from 15° to 16° Centigrade"; this is called the "calorie." The limiting temperatures must be defined, because it is not necessarily true that the same amount of energy would raise the temperature of one gram of water from 10° to 11° , or from 60° to 61° , as from 15° to 16° —in fact, it does not. This definition of a practical unit for measuring heat energy is not an ideal one, because it makes the unit of energy depend upon so many extraneous conditions, viz., all those involved in the definition of temperature. It would be much better theoretically to choose some heat effect which is independent of temperature, e.g., the energy required to make one gram of water boil away at normal atmospheric pressure; but such a unit could not be used practically. Experiments show that the amount of energy required to raise the temperature of one gram of water one degree at any temperature is nearly one calorie; and so for all practical purposes this is assumed. The

number of ergs equivalent to one calorie has been called the "mechanical equivalent of heat." Its value is 4.187×10^7 , according to the best determinations. There are in general two experimental methods for measuring this most important quantity—a mechanical one, depending upon the production of the rise of temperature of the water by a paddle revolving in it; an electrical one, in which the rise in temperature is produced by the heating effect of an electric current. In the first method the amount of work done is measured directly in ergs by a suitable dynamometer; in the second, the electrical quantities, current resistance, and electromotive force are measured and the number of ergs calculated ($\text{energy} = Eit$). (See ELECTRICITY.) The mechanical method was first used accurately by Joule (1843-45) and more recently by Rowland (1878) and by Reynolds and Moorby (1897). (The last two investigators did not measure the calorie directly, however.) The electrical method was also first used by Joule; and within recent years it has been perfected by Griffiths (1893), Schuster and Gannon (1894), and Callendar and Barnes (1899). (For a full discussion of these experiments reference should be made to an article by Ames in *Reports of the International Congress of Physics*, vol. 1, Paris, 1900.) It should be noted that previous to the experiments of Joule both Carnot and Mayer had made calculations of the mechanical equivalent of heat, using the numerical values found for certain properties of gases.

Specific Heat. It is found by experiment that the heat energy required to raise the temperature of bodies varies greatly with the material of the body, with the external conditions, and slightly with the initial temperature. The number of calories required to raise the temperature of one gram of a substance from t° to $(t+1)^\circ$ under given conditions is called the "specific heat" of that substance at t° and under the specified conditions. Ordinarily these conditions are those of constant atmospheric pressure, but it is possible to make the condition one of constant volume in the case of gases. (Methods for the measurement of specific heats are described under CALORIMETRY.) The specific heat of a gas at constant pressure is greater than that at constant volume by an amount equivalent to the energy required to expand the gas against the constant pressure, because, as has been stated, no appreciable work is necessary to produce the expansion of the gas itself. The ratio of these two specific heats of a gas is a most important constant for that gas and may be determined directly by several methods. Its value for hydrogen, oxygen, and nitrogen is almost exactly 1.4. (See ELASTICITY.) The specific heat of a substance varies with its temperature. Its value for water at different temperatures is now known quite exactly, owing to the recent experiments of Callendar and Barnes. Its value for solids at different temperatures is hard to obtain, and under ordinary conditions the variations are not important. Boron, carbon, silicon, and iron, however, have specific heats, which increase markedly with increase of temperature. The specific heat of a substance which can exist in several allotropic forms varies with the modification; thus, at ordinary temperatures the specific heat of graphite is 0.202, of charcoal is 0.241, of diamond is 0.147. When a substance changes its state from solid to liquid and then to vapor, its specific heat

changes too; thus, the specific heat of ice is about 0.50, of water it is 1.00, of steam it is 0.48. Owing to this change in the specific heat of a substance when its molecular arrangement is altered, there is a curious property observed in the case of iron. If an iron wire is raised to a "red heat" in a flame, then removed and allowed to cool, its color disappears, then reappears, and soon disappears again for good. This is called *recalcescence*. It is due to the fact that as the iron first cools from its red heat it comes to a state when the molecules rearrange themselves owing to some internal condition of instability, and in so doing liberate energy, which is at once manifest by the iron becoming red-hot again, but at a lower temperature than before.

It was observed by Dulong and Petit that, if the specific heats of different solids are compared, there is an approximate connection between them and the atomic weights of the solids. In fact, the product of the specific heat of a substance in the solid condition and its atomic weight is approximately the same for all substances, viz., 6.4. This product for any substance is called its "atomic heat," because by the definition of "atomic weight" it is proportional to the heat energy required to raise the temperature of one atom one degree. The agreement between the values of the atomic heat for different substances is not very exact, partly no doubt due to the fact that the conditions of temperature under which the specific heats were measured were not such as to make the other conditions of the solids comparable; e.g., one solid is nearer its melting point than is another at the same temperature. This law of Dulong and Petit has been extended by Woestyn to the idea of "molecular heats"; he thinks it probable that the heat energy required to raise the temperature of a molecule one degree equals the sum of the amounts of energy required to raise the temperature of the individual atoms. This extension of the law is not verified in the case of most compounds.

TABLE OF SPECIFIC HEATS

SUBSTANCE	Specific heat	Temperature
Water.....	1.000	15°C.
Mercury.....	.033	20
Copper.....	.092	50
Iron.....	.110	50
Zinc.....	.093	50
Platinum.....	.032	50

SPECIFIC HEATS OF GASES

	Constant pressure	Constant volume
Air.....	.2374	.1721
Carbon dioxide.....	.2109	.1730
Hydrogen.....	3.4090	2.402
Nitrogen.....	.2438	
Oxygen.....	.2175	

Expansion. In general when heat energy is added to a body, its volume is changed; and experiments prove that an approximate relation connects the change in volume of any substance and its change in temperature. If v_0 is the volume at 0° , and v is the volume at t° , the external pressure remaining constant, $v - v_0 = v_0 \beta t$ or $v = v_0(1 + \beta t)$, where β is approximately a

constant for any one substance (with certain marked exceptions). It is called the *coefficient of cubical expansion at constant pressure*, referred to 0° . [A more exact relation would be $v = v_0 (1 + \alpha_1 t + \alpha_2 t^2 + \alpha_3 t^3 + \text{etc.})$.] If the change in length of a linear dimension of the body—e.g., an edge of a cube, if it is in that form—is considered, it will satisfy a similar formula. Let l and l_0 be the final and initial lengths; then $l = l_0 (1 + \alpha t)$, where α is called the *coefficient of linear expansion*. If the body is in the form of a cube, whose edges have the length l_0 at 0° and l_1, l_2, l_3 , respectively, at t° , $v_0 = l_0^3$, $v = l_1 l_2 l_3$. Hence, if

$$l_1 = l_0 (1 + \alpha_1 t), \quad l_2 = l_0 (1 + \alpha_2 t), \quad l_3 = l_0 (1 + \alpha_3 t); \\ v = v_0 [1 + (\alpha_1 + \alpha_2 + \alpha_3) t + (\alpha_1 \alpha_2 + \alpha_2 \alpha_3 + \alpha_3 \alpha_1) t^2 + \alpha_1 \alpha_2 \alpha_3 t^3].$$

But since $\alpha_1, \alpha_2, \alpha_3$, are all extremely small in general this may be written $v = v_0 [1 + (\alpha_1 + \alpha_2 + \alpha_3) t]$; and it follows that $\alpha_1 + \alpha_2 + \alpha_3 = \beta$. If the body is isotropic, $\alpha_1 = \alpha_2 = \alpha_3 = \frac{1}{3} \beta$; but if the body is crystalline, the coefficients of linear expansion in different directions may be different and may even be of opposite sign. In this last case it might happen that the contraction in one direction would be so great as to make β negative, i.e., produce a diminution of volume with rise in temperature. The change in volume of water as the temperature changes is peculiar, inasmuch as it decreases while the temperature increases from 0° to about 4° C., and then it increases as the temperature continues to increase. This fact plays a most important part in the economy of nature, as, owing to it, when the temperature at the surface of a pond or lake falls below 4° , the cold water, being lighter, stays on the surface, and ice is formed. Ordinarily, of course, the colder a liquid is, the denser it is; and so, if the surface of a liquid standing in a tall vessel is cooled, the top layers will sink and the lower ones will rise. There will thus be *convection currents* until the whole liquid is at the same temperature. Similarly, if the bottom of a vessel of an ordinary liquid is warmed, there will also be convection currents. The motion of these liquid masses is evidently due to the force of gravity, making the denser liquid come below the lighter. The coefficients of cubical expansion at constant pressure are different for different liquids and solids; but for all gases they are practically the same, viz., 0.003662. This most important property of gases is called the "law of Gay-Lussac," although its accurate verification is due to Regnault. If Boyle's law is true for a gas, viz., at constant temperature the product of the pressure and volume of a given mass of gas remains constant, it follows at once that the change in pressure of a constant volume of a gas as the temperature is raised from 0° to t° obeys the law $p = p_0 (1 + \beta t)$, where p_0 is the pressure at 0° ; p that at t° ; and β is the same coefficient as that for changes in volume, viz., 0.003662. The law that the coefficient of change in pressure at constant volume for all gases is practically the same is sometimes called the "law of Charles." If both the pressure and temperature of a gas are changed—assuming Boyle's and Gay-Lussac's laws—it may be shown that under all conditions

is a constant for the gas, where ρ is the density at t° and pressure p . This may be written

$$\frac{p v}{m (t + 273)} = R,$$

where R is a constant for any one gas, and evidently equals $\frac{1}{273} \frac{\rho}{\rho_0}$, where ρ_0 is the density of the gas at 0° C. and at pressure p . It is evident, further, from the formula that, *if it could be supposed to apply to gases at very low temperatures*, at $t = -273^\circ$, $p v = 0$, an equation which in itself is meaningless. A lower value of t would lead to a negative value for $p v$, which is absurd. Therefore the temperature -273° C. is sometimes called "absolute zero on the gas scale of temperature"; and $t + 273$, or T as it is written, is called the "temperature on the absolute gas scale." (A more accurate determination of the coefficient of expansion makes the absolute zero -273.1° C.)

Methods for the measurement of coefficients of expansion are described in all treatises on heat. See Preston, *Theory of Heat*.

COEFFICIENTS OF CUBICAL EXPANSION

SOLIDS	
Platinum	0.000027
Copper	0.000051
Steel	0.000033
Brass	0.000056
Glass	0.000027
Zinc	0.000087
LIQUIDS	
Mercury	0.000182
GASES	
For all gases	0.003662 approximately

Changes in State. Fusion and Vaporization. If a flame is applied to a vessel, such as a glass beaker, in which there is a block of ice at a low temperature, at first the temperature will rise, but finally a temperature is reached when there is no longer any change, and the ice begins to melt. If during the process the mixture of ice and water is stirred, the temperature will remain unaltered until all the ice is melted; then the temperature will again rise until the water begins to boil, when the temperature is again constant until all the water is boiled away; and then the temperature of the steam will rise. Conversely, if the steam is cooled, it will begin to condense into water at the same temperature as that at which it boiled, *provided its pressure is the same*; but so long as it is condensing there is no change in temperature; then, when all is condensed, the temperature of the water will fall until it begins to freeze, as it will at the same temperature as that at which the ice melted, *provided the pressure on it is the same*; and during the process of freezing there is no change of temperature, but when it is completed there is again a fall. This course of events is common to all crystalline solids; but many solids, such as waxes, have no definite temperature at which they melt, but pass through a pasty condition from solid to liquid, the temperature continually rising; and the converse happens when they become solids. There is, then, in the case of ice and similar bodies, a temperature at which the solid and liquid states are in equilibrium together, unless there is addition or withdrawal of heat energy. This is called the "fusion point." There is also a temperature at which the liquid and the vapor are in equilibrium unless there is addition or withdrawal of heat energy. This is called the "boiling point." Both these equilibrium temperatures

vary with the pressure on the bodies. As the pressure is increased on a liquid, its boiling point is raised, and conversely; e.g., in the case of water, a change of pressure from 76 to 77 centimeters of mercury changes the boiling point from 100° to 100.37° .

FUSION AND BOILING POINTS

Fusion point	Boiling points at normal pressure
Platinum ... about 1800° C.	Sulphur. 444.5° C.
Copper " 1096	Mercury . . . 357
Gold " 1092	Water 100
Silver..... " 985	Ethyl alcohol . . 78
Zinc..... " 415	Ethyl ether . . . 34.6
Bismuth..... " 268	Carbon dioxide.. -79
Sulphur..... " 115	Oxygen..... -183
Mercury..... -39	Nitrogen... -194
	Hydrogen -238

As the pressure on most solids is increased, their melting point is increased also; but there are certain exceptions, viz., those substances which on melting occupy smaller volumes in the liquid than in the solid state. Such solids are ice, cast iron, bismuth. This change in the freezing point is, however, most minute. In the case of ice the melting point is changed from 0° to -0.0075° C. if the pressure on the ice is increased from one to two atmospheres. The phenomenon of "regelation" is due to this last fact. When the pressure on a piece of ice is increased, its melting point is lowered. Therefore, if two blocks of ice at 0° are pressed together, the ice under pressure at the point of contact has a melting point less than 0° , but being at 0° is at a temperature which is higher than its melting point, and so melts. The water which results from this is at a temperature lower than 0° ; and so as it flows out from under the pressure it freezes again, because now its freezing point is 0° . The motion of glaciers depends on this phenomenon.

The presence of nuclei greatly facilitates the processes of solidification, boiling, and condensation. A drop or a bubble cannot be formed without some nucleus (see CAPILLARITY); and a liquid can be cooled far below its freezing point if there is no nucleus and if the liquid is not disturbed or jarred. A liquid exposed in an open vessel will evaporate, i.e., will pass slowly into the form of vapor, at all temperatures below its boiling point. If, however, a large closed vessel is placed over the one containing the liquid, the evaporation will soon cease apparently—there is equilibrium between the liquid and the vapor. The process does not in reality stop; but the evaporation of the liquid is exactly balanced by the condensation of the vapor. Experiments show that this state of equilibrium is reached at a certain temperature when the pressure of the vapor is a definite quantity, viz., at the "boiling point" for that pressure; if the temperature is changed, so is the pressure which corresponds to equilibrium. If the temperature

is lowered, some vapor will condense; illustrations of this are the formation of dew, formation of drops of water on ice pitchers, etc. Again, if in the above experiment the volume of the space over the liquid is made smaller, some of the vapor will be condensed. Thus, there are two methods for the liquefaction of a gas or vapor—to lower the temperature and to decrease the volume. It was established by Andrews in 1869 that a vapor cannot be liquefied by any decrease in volume, however great, unless the temperature is

below a certain limit, which is different for different substances, and which is called its "critical temperature." But by lowering the temperature sufficiently and by making the volume small enough, all known gases have been liquefied. (See LIQUEFACTION OF GASES.) The critical temperatures of a few gases are given below:

CRITICAL TEMPERATURES

Carbon dioxide: 30.92°	Hydrogen -234°
Sulphur dioxide . . . 156	Oxygen -118
Sulphuric ether. . . . 194.4	Nitrogen... . . . -146
Water 365	
Ammonia 130	

If substances are dissolved in a pure liquid, both its freezing and its boiling points are altered; the former is lowered and the latter is raised, the amount of the change varying directly with the quantity of substance dissolved. In most cases, however, both the solid and the vapor formed are those of the pure liquid. If the dissolved substance is volatile, then it will evaporate also. Common salt and water serve as an illustration. If salt is added in small amounts to a vessel of water, a time will come when the water will no longer hold the salt in solution, but will deposit it; the solution is said to be "saturated." The amount of salt required to produce saturation varies directly with the temperature. If an unsaturated solution has its temperature lowered below 0° , the freezing point of the solution will finally be reached, pure ice will separate out, leaving the solution more concentrated; the freezing point of this solution is lower than that of the first; and so, as the temperature gets lower and lower, the solution becomes more and more concentrated until finally it is saturated. If now heat energy is removed, ice will form, but salt will be deposited also in equivalent amounts; this mixture of ice and salt is called the "cryohydrate," and the temperature of its formation is -22° C. (Other salts and liquids have different cryohydrates and different temperatures of formation.) In this cryohydrate of common salt there are 23.8 parts by weight of the salt and 76.2 parts of ice. Therefore, if a mixture is made of salt and ice in this proportion, it will form a solid whose melting point is -22° C.; and if it actually is at the temperature -5° or -10° , it will of course melt, and in so doing heat energy will be abstracted from surrounding bodies, because energy is required for two reasons—to melt the ice and to make the salt dissolve in the water. For this reason such a mixture is called a "freezing mixture."

The fact that heat energy is required to make a solid melt or a liquid evaporate is familiar from many experiments. Similarly heat energy is liberated when a liquid freezes or vapor condenses. The number of calories corresponding to the change in state of one gram of a substance under a definite pressure is called the *latent heat* for that change at the given pressure. Similarly, when one substance dissolves in another, there are, as a rule, changes in temperature, showing that heat energy is liberated or absorbed. The heat of solution is defined to be the number of calories produced when one gram of a substance dissolves in a great mass of a given solvent, a quantity so great that any further increase in it would not affect the heat energy liberated or absorbed. Values for latent heats and heats of solution are given in the following tables:

LATENT HEATS

SUBSTANCE	Fusion	SUBSTANCE	Vaporiza- tion
Water	80.02	Water	536.6
Sulphur	9.37	Ammonia	297
Benzene	30.85	Benzene	92.9
Mercury	2.82	Ether	90
Silver	21.07	Chloroform	58.5

HEATS OF SOLUTION IN WATER

Ammonia gas	+495.6
Ethyl alcohol	+ 55.3
Sulphuric acid	+182.5
Caustic potash	+223.3
Sodium chloride	- 18.22
Potassium chloride	- 59.7
Silver chloride	-110

+ Means rise in temperature.

- Means fall in temperature.

There are, of course, other changes of state than those mentioned; among these are sublimation, when a solid passes directly into the state of vapor; dissociation of a gas, when the molecules of a gas break up into other parts; etc. It is found, however, in all these cases that there will be equilibrium at a definite temperature only when a certain pressure is reached, and conversely.

Transfer of Heat. There are three processes by which the energy used in producing heat effects is conveyed from one point to another—convection, conduction, radiation. It should be particularly noted that in all cases a difference of temperature is essential for a transfer of energy, and that it is the body at the lower temperature which gains heat energy, while the body at the higher temperature loses it. *Convection* has already been described. It consists in applying a flame or "source of heat" to the lower portion of a column of some fluid; this portion expands, becoming less dense; then under the influence of gravity it rises to give place to some heavier portion of the fluid above it. The motion of the wind, of drafts of smoke in chimneys, of water in hot-water systems of heating, etc., are illustrations of this process. *Conduction* is illustrated when one end of a long metal rod is raised to a high temperature, while the other is maintained at a lower one. There may be observed a steady increase of temperature from the latter end up to the former; the heat energy required to produce this temperature coming from the "source of heat," which keeps the hot end at its high temperature by a process of "conduction" from particle to particle down the rod. Some bodies conduct better than others, meaning that the effect of the source of heat at the hot end is felt farther down the rod. Metals are all good conductors; but silver, copper, and aluminium are the best. Woods and cloths are poor conductors; so are all liquids, with the exception of molten metals, and gases also, relatively to their volumes. The principle of the miner's safety lamp depends upon conduction. The temperature of the hot gases rising from the flame through the gauze envelope of the lamp is made so low by the conducting away of heat energy by the gauze and the metal base that the exterior gas is not ignited. *Radiation* is the process by which heat energy is conveyed from one body to another by a wave process in the luminiferous ether. (See **RADIATION**; **ABSORPTION**; **ETHER**.) Illustrations

are afforded when the hand is held beside a stove or exposed to the sun. All bodies in the universe, so far as is known, are emitting these ether waves, owing to vibrations inside the molecules. These waves have lengths varying from less than 0.00002 of a centimeter to a few hundredths of a millimeter. They carry energy; and if they are absorbed by any body upon which they fall, this energy is, as a rule, distributed throughout the minute portions of the body, and it manifests heat effects. The total amount of energy radiated by a body increases as the temperature is raised; and, further, as the temperature rises, the body emits shorter and shorter waves—finally the body may become visible. If two bodies are allowed to radiate to each other, each loses energy by radiation and gains it by absorption, until finally there is equilibrium of temperature. It may be shown (see **RADIATION**) that the radiating and absorptive powers of any body are the same at any one temperature; and in general a body which is a good absorber is a good radiator, e.g., a body painted black; while, if a body is a poor absorber and therefore a good reflector, it is a poor radiator, e.g., a piece of polished metal. Some bodies are transparent to ether radiations of certain wave lengths and opaque to others; they are called diathermanous if the waves which are transmitted by them carry a large amount of energy which may be transformed into heat energy if absorbed. See **DIATHERMANCY**.

Consult: Preston, *Theory of Heat* (2d ed., New York, 1904); Tyndall, *Heat as a Mode of Motion* (new ed., ib., 1905); Maxwell, *Theory of Heat* (new ed., ib., 1902); F. M. Hartmann, *Heat and Thermodynamics* (ib., 1911); C. H. Draper, *Heat and the Principles of Thermodynamics* (ib., 1914); M. Planck, *Theory of Heat Radiation* (Philadelphia, 1914). For heat considered as a factor of organic evolution, see **EVOLUTION**.

HEAT, ANIMAL. See **ANIMAL HEAT**.

HEATH, hēth (AS. *hæp*, Icel. *heipr*, Goth. *haiþi*, OHG. *heida*, Ger. *Heide*, heath, O'Welsh, Bret. *coit*, Corn. *cuit*, forest, Gall. *cêto* in *Cêto-briga*, *eto-cêtum*, Lat. *cetum* in *bu-cetum*, cow pasture, *guer-cetum*, oak forest). A term of varied significance, applied originally to various members of the Ericaceæ (see below) and long used to designate areas covered by such plants. It has been still further extended to include most sterile, uncultivated tracts covered with low shrubs. In its more proper ecological sense, however, a heath may be defined as a plant community on sterile and commonly dry soil in which the dominant plant types are evergreen shrubs, chiefly ericads or ericad-like plants. The heath, defined in this way, is much less common in America than in Europe, although in the northern United States and Canada small areas of low evergreen shrubs are often found in which the bearberry (*Arctostaphylos*) and junipers dominate. Small heath areas are also found in mountain (even Alpine) districts. In the far northern regions and sometimes locally in the Northern States, habitats like the above are often covered with coarse mosses like *Polytrichum* or lichens of the genus *Cladonia* (including the reindeer lichen); these areas may be called moss or lichen heaths, since the soil conditions are those of the true heath, though the exposure is perhaps too great for the shrubs.

Heaths are conspicuous in the vegetation of

many Arctic and Antarctic areas, such as the Faroe and Falkland Islands. In the latter region the heather is replaced by *Empetrum*, a low evergreen shrub of the same family. Grasses and large mosses are abundant, the whole giving rise to thick layers of peat. These peat beds afford the only fuel supply of the Falkland Islands, since the climate does not permit trees to grow.

The origin of the heath is twofold: it may arise from a moor or undrained swamp (q.v.), or from a dry sandy area, as a beach or dune. This fact is of great ecological interest, since, so far as water content is concerned, a dune is xerophytic, while a swamp is hydrophytic. That dune, heath, and moor are closely related as to their ecological conditions, however, is shown not only by the twofold origin of the heath, but also by the fact that all typical dune, heath, and moor plants have identical and xerophytic structures (see XEROPHYTES); not only this, but the dominant plant families, conifers and ericads, are the same throughout. On the dune transpiration is great, perhaps because of the excessive exposure; on the heath and in the swamp transpiration is great in relation to absorption, probably because of the soil acids and the relative absence of bacteria. Hence in all three cases only those plants can thrive which are able to reduce transpiration by protective structures, and those structures are peculiarly prominent in conifers and ericads.

The heaths are small shrubs, distinguished by a calyx of four leaves and a bell-shaped or ovate corolla. The leaves are small, linear, and evergreen. The genus has been separated by some botanists into a number of genera, but the old name, *Erica*, is still commonly retained. The name "heath," however, is in popular language extended to many plants of genera nearly allied to *Erica*. The little shrub which chiefly covers the large tracts named moors or heaths (Ger. *Heide*) in Great Britain and on the con-

tinent of Europe, is the common ling, or heather (*Calluna vulgaris*), the only known species of the genus *Calluna*. It is also found in a few places in the eastern United States, where it was probably introduced. It is found on arid places and also in bogs. The flowers, which have much the appearance of being in spikes, are of a lilac-rose color, rarely white. They afford abundance of honey, and the beehives are therefore transported to the moors when the heather is in bloom. In bogs it contributes much to the formation of peat. In some of the Hebrides a decoction of heath is used for tanning leather. The plant is applied to various other



HEATHER.

uses in the Highlands of Scotland. About 400 species of *Erica* are known, and these, with few exceptions, are natives of the south of Africa. None are found in America. The British Isles produce seven species, of which some have been found only in Ireland and some in the southwest

of England; cross-leaved heath (*Erica tetralix*) and fine-leaved heath (*Erica cinerea*) are common plants in most parts of Great Britain, and, like most of the genus, are very beautiful when in flower. The heather bells of Scottish song are the flowers of one or both of these species. *Erica mediterranea* and *Erica carnea*, common in the southern parts of Europe, are very frequent ornaments of British flower borders, hardy plants, producing their flowers in great profusion in April. Many of the African species, remarkable for the size and beauty of their flowers, are much cultivated in greenhouses. Some of the South African or Cape heaths attain in their native region a much greater size than any European heath. The roots of *Erica scoparia* are known as bruyere and furnish the true brier pipes of France. See Plate of DICOTYLEDONS.

HEATH, HAROLD (1868—). An American zoölogist. He was born at Vevay, Ind., and graduated from Ohio Wesleyan University in 1893 and from the University of Pennsylvania (Ph.D.) in 1898. He was professor of biology at the University of the Pacific in 1893–94 and then taught zoölogy at Leland Stanford, where he became professor in 1909. He served as naturalist for the United States Fish Commission on the *Albatross* in 1904 and was a member of expeditions to Florida in 1890, to the California coast in 1905, to Japan in 1906, to the Pribilof Islands in 1910, and to Brazil in 1911. His papers deal chiefly with the anatomy of invertebrates and mollusks, and he is author, besides, of *Animal Forms* (1900) and *Animals* (1902).

HEATH, JAMES (1629–64). An English historian, born in London and educated at Westminster School and for two years at Christ Church, Oxford, from which he was expelled by the visitors from Parliament in 1648. He was an ardent Royalist and lived in exile with Charles II. He wrote: *A Brief Chronicle on the Late Intestine War* (1661); *The Glories and Magnificent Triumphs of the Blessed Restitution of King Charles II* (1662); *Flagellum: or, the Life and Death, Birth and Burial of Oliver Cromwell* (4th ed., 1669); and a number of poems, which posterity has permitted to remain undisturbed.

HEATH, NICHOLAS (c.1501–78). An English prelate and jurist, born in London, and educated at St. Anthony's in London, at Corpus Christi, Oxford, and at Christ's College, Cambridge. In 1539 he was made Bishop of Rochester. He "oversaw and perused" the Great Bible of 1541 and was made Bishop of Worcester after Hugh Latimer's resignation. In 1550 he refused to accept Cranmer's form for the Prayer Book and was imprisoned and deprived of his see, but was restored at the accession of Mary and in 1555 became Archbishop of York. When Mary died, Heath did all in his power to bring about the immediate and peaceful accession of Elizabeth; but when the question of Elizabeth's supremacy came before Parliament, Heath opposed her claim to the headship of the English church and later refused to take the oath required by the Act of Supremacy. For this contumacy he was again deprived of his see (1659), imprisoned in the Tower, and then permitted to retire, on the understanding that he was not to meddle with politics, profane or ecclesiastical. How much liberty he was allowed in his later years is disputed, it being sometimes claimed that much of the time he was in strict confinement. Consult Strype's *Works* and, for the Catholic

view, Phillips, *The Extinction of the Ancient Hierarchy* (London, 1905).

HEATH, PERRY SANFORD (1857-). An American newspaper publisher and editor, born at Muncie, Ind. He was editor and publisher of Western papers until 1881, and then until 1893 was a correspondent at Washington, D. C. He had charge of the literary departments of the Harrison nominating campaigns (1888, 1892) and of the McKinley nominating campaign (1896), helped frame the North and South Dakota constitutions, and in 1894-96 was president and editor of the Cincinnati *Commercial-Gazette*. While First Assistant Postmaster-General (1897-1900), he developed the present system of free rural mail delivery. From 1900 to 1904 he served as secretary of the Republican National Committee. He published the *Salt Lake Tribune* in 1901-05 and founded the *Salt Lake Telegram* in 1902, also becoming interested in various business enterprises. He is author of *A Hoosier in Russia* (1887).

HEATH, SIR ROBERT (1575-1649). An English jurist, born at Brasted in Kent and educated at Tonbridge and at St. John's, Cambridge. He studied law, rose rapidly, became Solicitor-General in 1621, was knighted and entered Parliament in the same year. He showed himself a thorough Royalist in Parliament in 1623-25, and was appointed Attorney-General as a reward for his services. In this office he was active and severe; he arrested in 1629 Holles, Eliot, Selden, and other members of the Commons, arguing that privilege did not protect after the close of a session, and carried their prosecution through successfully and was equally strenuous and successful in his prosecutions before the Star Chamber. But there was a rumor that he was Puritan in secret, and he was removed without cause. But his loyalty did not waver; he accompanied the King to York in 1642 and later to France, where he died at Calais. Consult the autobiography in vol. i of the *Philobiblon Society Miscellany* (New York, 1861).

HEATH, WILLIAM (1737-1814). An American soldier. He was born at Roxbury, Mass., and was brought up on a farm, upon which he lived up to the outbreak of the Revolutionary War. He was a member of the General Court of Massachusetts in 1761, entered enthusiastically into the political movement that culminated in the Revolution, and from 1771 to 1774 was a member of the committees of Safety and Correspondence. In the latter year he was elected to the Provincial Congress. His interest in the organization of the militia, of which he had made a special study, obtained for him in December, 1774, an appointment as a brigadier general of militia, and as such he was present at the British retreat from Concord after the battle of April 19, 1775. Thereafter he was made major general of militia, and on June 22, 1775, was commissioned by Congress a brigadier general of the continental troops. In March, 1776, he was ordered to New York, on August 9 was promoted major general, and after the battle of White Plains, in the following October, was placed by Washington in command of the troops in the Highlands. In 1777 he became commander of the Eastern Department, with headquarters at Boston, and in June, 1779, was transferred to the command of Hudson River posts, where, with the exception of his coöperation with the French in Rhode Island in 1780, he

remained until the close of the war. After the war he was a member of the Massachusetts Convention that ratified the Federal Constitution, was a State Senator in 1791-92, and was probate judge of Norfolk County in 1793. In 1806 he was elected Lieutenant Governor of Massachusetts, but declined to serve. His *Memoirs*, which contain much valuable material on the Revolutionary period, were published in 1798 by authority of Congress and were last republished under the editorship of William Abbatt in New York in 1901. His correspondence is published in the "Heath Papers," vols. iv-v, *Massachusetts Historical Society Collections* (7th series, Boston, 1904-05).

HEATHCOAT, hēth'kōt, JOHN (1783-1861). An English inventor, born at Duffield, near Derby. He worked with a hosier, and later with a stocking maker and frame smith at Nottingham. In 1808 and 1809 he patented his complicated machinery for the manufacture of lace. His factory at Loughborough was attacked by the Luddites, and most of his machinery and lace destroyed. Rather than continue at Loughborough, Heathcoat refused an award of £10,000 for damages. He built a new plant at Tiverton and for 26 years (1832-59) represented that constituency in Parliament. He built schools at Tiverton and planned many charities, which were carried out by his daughters.

HEATH COCK, HEATH HEN. See **BLACK COCK**; **GROUSE**.

HEATHCOTE, hēth'kōt, CALEB (1665-1721). An American merchant, born in England, where his father was mayor of Chester. He established himself with his uncle, Capt. George Heathcote, a large shipowner, in New York, and upon Heathcote's death inherited his fortune. He was a zealous churchman and was one of the petitioners for a license to build the first Trinity Church. He held many offices, among them those of mayor of New York (1711-14); judge of admiralty for New York, New Jersey, and Connecticut (1715-21); commander in chief of the forces of the Colony; surveyor-general of the eastern district of North America in 1715-21; and receiver-general of the customs for the province from 1697 to 1721. His large estates descended to his two daughters.

HEATHEN CHINEE, THE. A celebrated satiric poem by Bret Harte (1869). in the metre of the threnody in Swinburne's *Atalanta in Calydon*, selected, as Harte says, because "it was just the kind of thing which Truthful James would be the last man in the world to adopt in expressing his views." It is probably the best known and most quoted of the author's writings.

HEATHER, hēth'ēr. See **HEATH**.

HEATH'ER BLEAT'ER. A provincial name in England for the common snipe (q.v.), in allusion to the love cry of the cock bird in the breeding season.

HEATHFIELD, GEORGE AUGUSTUS ELIOTT, first BARON (1717-90). A British soldier, born at Stobs, Roxburghshire, Scotland, Dec. 25, 1717. He was educated in Edinburgh, at the University of Leyden, and at the French military college of La Fère. He served in the War of the Austrian Succession, being present at the battles of Dettingen and Fontenoy. As colonel of a regiment of light horse, he took part in the Seven Years' War in the years 1759-61. In 1762 he was second in command in the English expedition to Cuba and for his services there was raised to the rank of lieutenant general. In

1775, when, because of the *pacte de famille* between France and Spain, it was thought very probable that one or both of these countries, taking advantage of the rebellion in America, would attack England, an experienced soldier was deemed necessary for the command of Gibraltar, and Elliott received the appointment. Ample time was given to him to repair the defenses, as it was not until 1779 that the Spanish undertook a regular siege. In the attacking force of French and Spaniards were the greatest engineers of the age; but their efforts to reduce the stronghold, including the terrific cannonade with the floating batteries of the Chevalier d'Arcon in 1782, were futile. Elliott and his little garrison, though at the verge of starvation because of the blockade, held out until relief came from a force in command of Lord Howe, who succeeded in breaking through the Spanish lines with supplies. At the conclusion of peace, in 1783, Elliott returned to England, where he was richly rewarded for his bravery. He was made Knight of the Bath and in 1787 advanced to the peerage as Baron Heathfield of Gibraltar. He died at Aix-la-Chapelle July 6, 1790. His portrait by Reynolds is in the National Gallery. Consult Drinkwater, *History of the Siege of Gibraltar* (new ed., London, 1844), and Adye's "Heathfield," in Wilkinson, *From Cromwell to Wellington* (ib., 1899).

HEATING AND VENTILATION. These topics are so closely related in sanitary and engineering discussions, as well as in the actual planning and erection of buildings, that they are generally considered together. Where artificial heat is seldom if ever required, little attention need be given to ventilation, since the people spend most of their time either out of doors or in loosely constructed buildings, with plenty of exposure to the outer air. In cold climates ventilation becomes as essential for complete healthfulness as heating is for comfort. Where much artificial heat is required, the fresh air provided as a part of ventilation must also be heated, which may add greatly to the expense of fuel. In general it may be said that the object of heating is to provide a uniform moderate temperature, and the aim of ventilation is to displace foul air with pure. The moisture in the air plays an important part from a sanitary standpoint; for best results it should approximate about 60 per cent of saturation but is generally much less; hot-air furnaces are especially noted as giving very dry air. It should be noted that the atmosphere of a poorly ventilated, overcrowded room gradually becomes saturated with watery vapor.

What constitutes a comfortable temperature is largely a matter of habit; it is generally less in temperate than in cold climates. Heating has for its standard in the colder parts of the United States and in Canada a temperature of about 70° F., against some 62° in England. Heat for warming is produced by the combustion of fuel (q.v.), except in those few rare cases where electricity generated by water power (as at Boise, Idaho) or the stored heat from underground waters is utilized. Coal and wood are most commonly employed as fuel, but coke, oil, and gas are also used. Open fireplaces, stoves, or furnaces may be employed for burning any of the fuels named, except that oil is rarely if ever burned in open fireplaces.

The methods of heating are classified as direct and indirect radiation. Direct radiation takes

place when the heat is generated either in the room, as with open fireplaces, stoves, and furnaces, or when hot water or steam is produced by means of central furnaces and then conveyed through pipes to radiators located in the various compartments to be heated. Indirect radiation involves the bringing in of air warmed by passing it over some central heated surface, generally a furnace, but sometimes a coil of steam or hot-water pipes. It will be noted that direct radiation heats the objects already in the room, while indirect radiation brings in heated air. Thus, indirect radiation may be a means of ventilation. The same end may be effected by locating the heating surface in the room and passing the fresh air over it, which is known as direct-indirect radiation. It should be noted that air is heated only by convection or rubbing contact produced by air currents, while solid objects are heated by the direct rays of radiant heat; thus, e.g., fireplaces heat by direct radiation, i.e., by sending the heat out in straight lines until it is deflected or absorbed by something other than air. With stoves and radiators the heat is largely made available by convection, i.e., by heating the air that impinges upon or passes over the heated surface.

History. The first application of artificial heat consisted, most likely, in lighting a fire of dried sticks and leaves in a grove, a cave, or other natural shelter. Where tents or wigwags came to be erected, the fire would be lighted on the middle of the floor, with perhaps a hole in the roof for smoke to escape. The Romans warmed their apartments chiefly by portable stoves, without any regular exit for the smoke and fumes. A brazier of charcoal is still the chief means of heating sitting rooms in houses in Spain and Italy, which are in general without chimneys, and is comparatively a modern invention. The early fireplaces were without chimneys, and the flues extended only a few feet up in the thickness of the wall. They were then turned out through the wall, to the back of the fireplace, the openings into the outer air being small oblong holes. There is no evidence of chimneys earlier than the twelfth century, and brick was not used for their construction till late in the fifteenth century. Of the modern methods of heating dwellings by fireplaces, stoves, furnaces, steam and hot-air apparatus, the fireplace is the oldest, having been employed during the Middle Ages, and becoming in northern Europe an important feature of the architectural development. The fireplace, at first wholly of masonry, was afterward framed in elaborately carved oak, and the settle, which soon became an essential part of mediæval furniture, was built into the angle of the chimney. Stoves are said to have been used for the first time in Alsace in 1490, but they did not come into general use as a means of heating until three centuries later. In 1744 Benjamin Franklin invented a cast-iron open heater, which projected out from the chimney and so radiated heat into the room from the back and sides as well as from the front. The cast-iron box stove was invented in 1752. Early in the nineteenth century cylindrical sheet-iron stoves were made. About 1830 the first baseburner was put upon the market in America, and since that time the different types of stoves have been developed, by successive patents, to their present state of perfection.

The first attempt to construct a hot-air furnace for supplying pure heated air to rooms was

probably made by Franklin. Early in the nineteenth century the method of warming by hot air was developed. The first hot-air furnace in New England is said to have been built in Worcester, Mass., in 1835. Heating by hot water was an invention of great antiquity. According to Seneca, the baths of Rome were warmed by water running through brass pipes, which at one point were heated in a fire. With the fall of Rome this method of warming seems to have been forgotten, for we next hear of it as a fresh discovery made in 1777 by M. Bounemain for warming the hothouses of the Jardin des Plantes in Paris. Heating by hot water was introduced into England in 1816 by the Marquis de Chabonne. It was used in Canada for many years before it became popular in the United States, where it was not generally adopted till the last quarter of the nineteenth century. Heating by steam was proposed, in the middle of the eighteenth century, by William Cook, of Manchester, England. In the United States it was not introduced till nearly a century later. The first building in America warmed in this way was the Eastern Hotel of Boston, and the first factory the Burlington Woolen Mill, Vermont.

Fireplaces. Fireplaces are used in modern heating systems principally for ventilation purposes and for imparting an air of comfort and cheerfulness in a room. Fireplaces are inefficient, since they utilize only 10 to 15 per cent of the heating value of the fuel, and as they warm only by radiation the heat they give off is diffused irregularly; as an adjunct to a heating system they are, however, of great sanitary utility. The fireplace, besides its cheerfulness and sentimental features, may be ornamental, while as an efficient aid to ventilation it is most useful. The substitution of brick-lined for nonlined fireplaces conserves some of the heat. Much also depends upon the shape of the fire box, or grate itself, where coal, rather than wood, is burned. The chief object is to present as large a surface as possible of glowing fire to the front in order to secure as much radiant heat as possible. With this view the grate is made long and deep, in proportion to its width from front to back.

Placing grates almost on a level with the floor is a mistake. The floor and the lower part of the person receive no share of the radiant heat. The chimney throat, instead of a gulf drawing in a constant wide current of the warm air of the room, and causing drafts from windows and doors towards the fireplaces, should just be sufficient to admit the burned gases and smoke. Fireplaces are sometimes so arranged in connection with an air inlet as to introduce a current of warmed air into the room. In cold climates fireplaces must be supplemented by more effective means of heating.

A stove is simply an inclosure of metal, brick, or earthenware, heated by burning a fire within it, and then giving out its heat to the air by contact and to surrounding objects by radiation. The simplest arrangement is a hollow cylinder or other form of iron standing on the floor, closed at top, and having bars near the bottom on which the fire rests. The door by which the coals are put in being kept shut, the air for combustion enters below the grate, and a pipe issuing from near the top carries the smoke into a flue in a wall. If this pipe is

or more bends, the heated gases from the fire may be made to give out a large proportion of their heat before they enter the wall. A stove made of cast iron is extensively used for heating the cheaper form of buildings in the United States and is the principal means employed in heating farm buildings. The low first cost of the stove has had much to do with its extensive use. The great objection to this form of stove is that the metal is apt to become overheated, which not only gives rise to accidents, but lessens the percentage of humidity in the air. It adds greatly to the dust contents of the air and is decidedly objectionable from a sanitary standpoint. It has an efficiency for warming purposes of from 40 to 60 per cent of the heating value of the fuel, which makes it a decided improvement over the fireplace. It introduces no additional air for ventilation purposes and is objectionable for that reason.

Furnaces. In ordinary hot-air furnaces the fire is burned in a small compartment within the inner case, and the air is warmed by circulating between the inner and outer cases. When placed in the apartment or hall to be warmed, the outer casing has perforations about

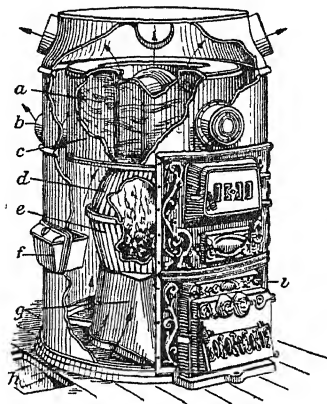


FIG. 1. FURNACE.

a, division plate; b, smoke pipe; c, steel-plate radiator; d, body; e, fire pot; f, water pan; g, ash pit, h, cold-air duct; i, dust flue.

the top for the issue of the warm air. Usually the furnace is placed in a separate room or cellar, and the warm air is conveyed to the different parts of the building in pipes or flues, while fresh air is drawn to the furnace through a fresh-air inlet and duct from outside the building to the openings in the outer casing of the furnace. The warm-air pipes are generally of tin plate, suspended from the ceiling of the cellar, in their horizontal course, or from the beams supporting the floor above, and carried upward in the partitions to the higher floors to be heated.

The heated air is admitted to the several rooms through registers. Each room heated should have a separate pipe line, provided with a damper at the furnace. Each register should be supplied with valves, so the heat may be regulated in the room. The several small openings in the registers should have an aggregate clear area at least twenty-five per cent greater than the cross sectional area of the heat pipe. The supply of fresh outdoor air to be heated and distributed should be ample, for otherwise the air circulation will be irregular and the rooms will

not heat uniformly. The fresh-air box should be as nearly air-tight as possible, and both it and the inlet should be kept well away from any source of contamination. Economy and health

district heating systems erected as adjuncts of electric-power plants for utilizing the exhaust steam and other wastes of heat.

Steam and hot water heating is practiced with direct radiation, in which case the radiators are placed directly in the rooms to be heated, or by indirect, in which case the radiators are located in the air passages leading to the room. The great disadvantage of direct radiation of either steam or hot water is that it merely warms the air already in the room, instead of bringing in a constant supply of fresh warm air. This matters little where an independent system of ventilation has been provided and is intelligently used; but in small buildings, particularly houses, there rarely is a system of ventilation. To meet this objection the indirect system or the direct-indirect is often employed in place of direct radiation. Mechanical draft, when the air is circulated by a fan driven by power, is employed in one

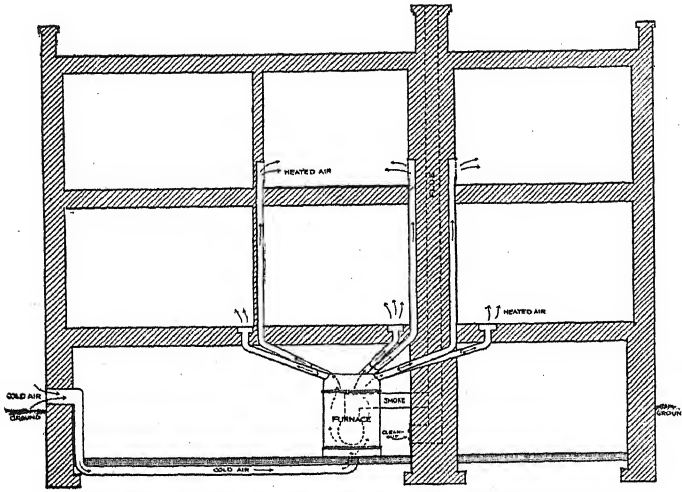


FIG. 2. HOT-AIR SYSTEM.

alike demand that furnaces be large enough to serve their purpose without being forced, since forcing is wasteful of fuel and overheats the room air supply. The latter is not only bad in itself, but increases the danger of contamination by the gases of combustion. Some means of mixing cold air with hot is desirable, in order to avoid the necessity of shutting off of the fresh-air supply when the room becomes too warm.

It is very difficult to warm uniformly all parts of a building with a hot-air furnace. The rooms on the windward side are quite likely to be cold. This is due to the fact that the force for circulating the heated air is very feeble and is produced only by the difference in temperature of the cold air entering the heater and the hot air leaving the same. It is desirable to have a vent pipe for the discharge of air in each room in the interest of more uniform distribution of heat. Generally it is not desirable to attempt to move the warm air a greater distance than 15 feet horizontally, and this limits the application of the hot-air furnace to small buildings. The system is commendable in view of the ventilation it produces, although objectionable because of the dryness of the heated air and because of the dust it contains.

Steam and Hot-Water Heating.

Either steam or hot water is the most common medium for heating the better class of residences and large buildings and groups of buildings. Either may be conveyed long distances with ease, and both are practically unaffected by the direction or the strength of the wind—freedom from a limitation which is one of the greatest drawbacks to the use of hot-air furnaces. Steam and hot water may be produced in connection with a steam plant for power purposes, which has proved of great importance in connection with

type of indirect heating system used frequently for large buildings.

Both steam and hot-water systems require a boiler or heater, a pipe system, and radiators. As the hot water is circulated at 140°F. against 212°F. for low-pressure steam, the radiating surface for hot water must be larger by about 166 per cent than for steam. Hot-water fitting requires greater care in design and construction than steam, due to the fact that the circulating force in hot-water heating is due to the difference of temperature in the ascending and descending column and is feeble; it is overcome by obstructions in pipes, bad alignment, etc.

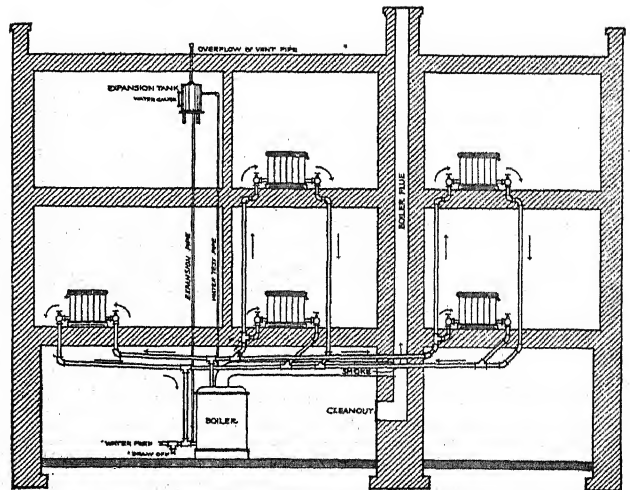


FIG. 3. HOT-WATER HEATING — USUAL METHOD OF PIPING.

The circulation is also inversely as the resistance in a pipe, and hence the distribution of heat is greatly affected by the pipe construction. Aside from greater care, there is no distinction in the process of pipe fitting for hot water or steam;

both are old arts, and both are practiced by the same workmen.

Hot water has this advantage over steam, viz., that it begins to yield heat very soon after the

ing systems, or for hot-water heating, are usually built of cast-iron sections connected together by nipples with push or threaded joints. These boilers are extremely durable, are low in first cost, and perfectly safe for the low pressures employed. They are usually as economical as any type of boilers. The heating boiler is usually designed for burning from four to six pounds of coal per square foot per hour and so as to require attention only once in 8 to 12 hours, thus making it nearly automatic in operation.

The choice of a boiler, from the many types and styles available, will depend upon a variety of local and even individual conditions. Thus, a vertical boiler may be chosen where horizontal space is scarce and vertical space is ample; or a water-tube boiler may be selected where a high pressure is to be carried for power purposes. Where fuel is cheap or the service is likely to be temporary, a boiler of low efficiency may be permissible, to save a relatively large capital outlay. The character of labor readily available as boiler attendants may have a very important bearing upon

the choice of a boiler. Thus, for heating most residences and many school buildings simplicity, coupled with a maximum of safety, even under neglect, may be of more importance than economy of fuel. Sectional boilers are advantageous here, since a small portion, instead of the whole boiler, may give way in case of accident. Under other conditions fuel economy may be put first, with the understanding that the continuous service of a skilled fireman will be insisted on. In large heating plants, particularly central heating stations (see below), automatic stokers may be used to feed coal to the furnaces and

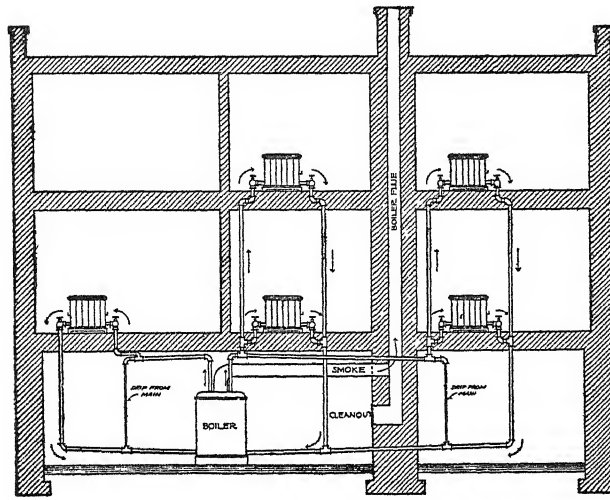


FIG. 4. STEAM HEATING — TWO-PIPE SYSTEM.

fire is started and continues to do so until the water cools, while there can be no heat from steam plants until a water temperature of 212° F. has been attained, and none after it falls below that point. On the other hand, steam heat may be shut off more quickly than water, since the latter continues to give off its heat for a much longer period, but this is modified somewhat by the fact that the hot-water system contains a large mass or weight as compared with the steam system, which makes it relatively slow in warming. The temperature in the hot-water system is controlled by partly closing a valve, which is not the case with the steam-heating system. The hot-water system works without noise, while the steam system is likely to be affected by water hammer and to be very noisy when steam is first turned on.

Steam boilers and hot-water heaters alike require a furnace, with a grate surface for burning the fuel and a heating surface for imparting the heat thus derived to the water in the boiler or heater. Where steam for both power and heat is to be generated, the boiler will be chosen principally for its suitability for power, or wholly so if the exhaust steam from the engine is to be used for heating. For this condition some suitable type of power boiler built for high-pressure steam should be adopted. Such boilers are fully described in special works on boiler construction and are frequently subject to inspection by legal authorities. Where the boiler is employed for heating only, low-pressure steam of 1 to 10 pounds' pressure is likely to be used, and the boiler need not differ very much from a water heater, except that the former has a reservoir for steam mounted above the heating surface, while the latter has not. Boilers for low-pressure steam for modern heat-

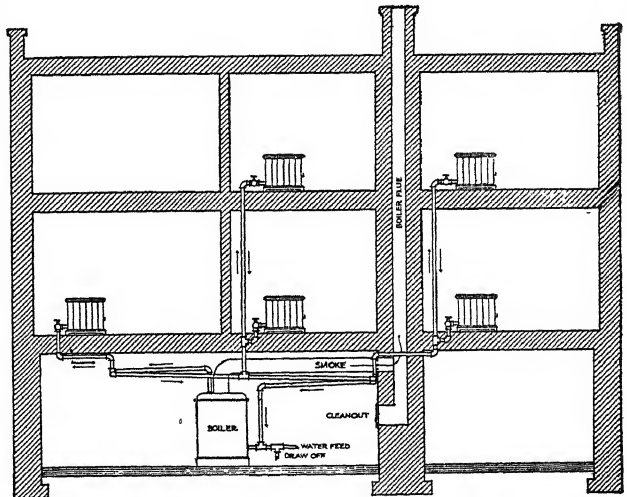


FIG. 5. STEAM HEATING — PARTIAL-CIRCUIT SYSTEM.

also mechanical means for removing the ashes. See **BOILER**.

Piping and Radiators. Pipes for distributing both steam and hot water and for returning the condensed steam and the partially cooled

water to the boiler and heater, respectively, are generally of wrought iron or steel connected with screw joints formed by means of couplings. The

between the steam and water in steam pipes, to be drawn off. The indirect radiators are of either cast or wrought iron, placed in a chamber, so that the fresh-air supply to be warmed may be passed over or through them. Some of the essentials of radiator designs are ample radiating surface, free passages to minimize friction, and good drainage in the case of steam radiators. To prevent the escape of heat where not needed for warming, steam and hot-water pipes are covered with asbestos, felt, or other insulating materials. Where high-pressure steam is used for heating, it is generally reduced before entering the distributing system, since steam at low pressure is nearly as valuable for heating and is less likely to cause water hammer or leaks or other difficulties. Over 212° F. would be unpleasant if not dangerous to those coming near or in contact with the radiators. Recent improvements in heating include the securing of a partial vacuum in the pipes and radiators after admitting the steam, thus lessening the trouble with air. It may also be

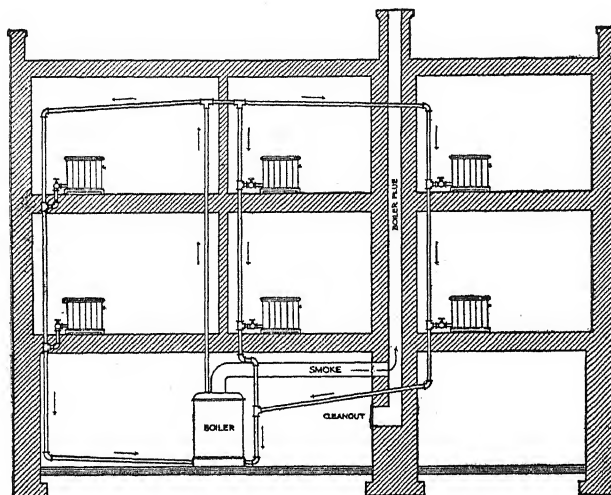


FIG. 6. STEAM HEATING — DIRECT-CIRCUIT SYSTEM.

pipe lines and radiators are controlled by various steam, water, and air valves, some of which are automatic. In most isolated plants the circulation is maintained wholly by gravity. Originally the radiating surfaces were mostly of cast-iron pipe, in horizontal lines; but this was superseded by coils of wrought-iron pipe with standard fittings, and these, in turn, have been largely replaced by vertical radiators, of either cast or wrought iron. For direct heating cast-iron sectional radiators are most commonly used.

For heating purposes steam is employed principally at low pressures; the pressure seldom exceeds 10 pounds per square inch; it is usually less than 2 pounds above the atmosphere in radiators, and in many recent installations it is maintained at less than atmospheric pressure. The latter condition is made possible by maintaining a vacuum on the system. This latter system is now frequently called the vapor or vacuum system and possesses most of the ad-

mentioned that fans are employed to aid the circulation of air in the indirect systems of steam and hot-water heating.

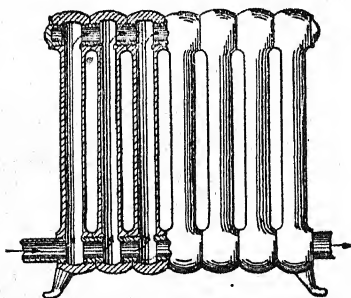


FIG. 7. SECTIONAL RADIATOR FOR HOT-WATER HEATING.

vantages of the hot-water systems as to ease of control, noiseless operation, etc.

For steam the connections enter and leave the vertical radiators at the base, but hot-water radiators have connections at the top as well as at the bottom. This allows the air, which collects at the highest point in all water pipes and

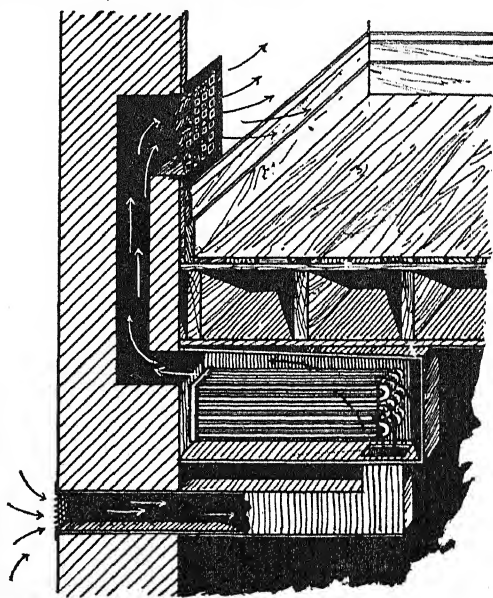


FIG. 8. RADIATOR FOR INDIRECT SYSTEM.

Electric Heating. Heat is developed by the passage of an electric current through any conductor; the greater the resistance of the conductor, the higher will be the temperature to which it is raised by the passage of the current. This is the principle upon which all electric heaters are constructed. These heaters have come into considerable use since 1895 for heating street cars. Their general construction is as follows: wire of high resistance is embedded in asbestos, fire clay, or other refractory material, and built up into plates of large radiating surface, these being generally inclosed between iron

plates. The current is passed through the resistance wire, which at once becomes very hot and in turn heats up the refractory material and the inclosing iron. When the heater has been brought up to the required temperature, the current may be turned all or partly off, and, owing to the nature of materials used, the heater will retain its heat for a long time. To heat water or other liquids the resistance coils or the cases which contain them may be placed in the liquid to be heated. Electric heating is used but slightly, except in electric street-railway cars, where current is more readily available than any other means of heating. The heaters are placed beneath the seats, running throughout the length of the car; thus, a good distribution of the heat is possible, making a pleasant contrast with the heat derived from the small red-hot coal stove formerly used. In special cases, where economy is of relatively small importance in comparison with, say, advertising effects or convenience, electric heating is used for apartments in buildings. Its cost is so much greater than the more direct utilization of fuel that the general use of electric heating is a luxury in which even the very rich do not indulge. This may be the better appreciated when it is remembered that there is a loss at every step in the process of developing heat by electricity, and that the steps are many. Thus, there is a loss in the combustion of fuel, in the transformation of the heat so obtained into steam, in the utilization of steam in the engine, in the conversion of the power thus obtained to electric energy, in the transmission of that energy through wires to the electric heater, and finally in the reconversion of the electric energy to heat.

Electricity is used extensively for cooking despite its fundamental cost, which, however, is largely offset by saving in labor. One of the great advantages of the electric current for cooking is that though there is great loss of power in the course of transmission, there is little loss of heat at the point where it is applied, while only a small proportion of the fuel burned in ordinary cookstoves is utilized for cooking. See **ELECTRIC HEATER**.

Heating with Artificial Gas is far less expensive than electric heating, but with illuminating gas at \$1 per 1000 feet it costs some four to ten times as much as heating with coal. Where cheap fuel gas is available the case for artificial gas heating is not so bad. Gas may be used in fireplaces, stoves, hot-air furnaces, and steam and hot-water systems. For occasional use in fireplaces or other heating apparatus placed in living-rooms gas is often advantageous. It makes no dust, and thus possesses a great advantage over coal or wood. But without good ventilation it vitiates the atmosphere; or at least it consumes much of the available oxygen and may give off objectionable gases. Gas for cooking is rapidly growing in favor, particularly for summer use and for small dwellings and apartments.

The Choice and Design of Heating Plants. The factors entering into both the choice and design of heating plants are many and various, including range of temperature through which the air is to be raised, the size and character of the building to be heated, the sort of fuel to be used, the heating system to be employed, and the amount of ventilation, if any, to be provided.

The amount of heat needed to warm any building depends upon the loss of heat by conduction

through walls and windows and by infiltration and leakage of air; it has no scientific relation to the cubic contents. While the heat losses vary with different character of material, yet in practical building construction the heat losses from buildings for the same purpose are fairly uniform. Coefficients for heat losses were determined by E. Peclét, of Paris, as early as 1860, and have been substantiated by extensive application. Tables of coefficients are published in works by Peclét, Box, and Carpenter. The heat loss will approximate the following in ordinary structures, the amount being expressed in B. T. U. per square foot per hour per degree difference of temperature: ordinary window, 1 B. T. U.; ordinary exposed wall, $\frac{1}{4}$ B. T. U. The air leakage is often expressed as a function of the cubic contents, but more scientifically it is a function of the exposed wall and glass surface.

The amount of heat, coal, and radiation needed depend directly on the difference of temperature to be maintained in the building and outside. The usual basis for all American calculations is the attainment of 70° F., the original temperature varying with the locality and season, sometimes falling to -20° F., or even lower. In the matter of the individual buildings there must be considered the area of the ground plan, the number of stories, the number and cubical contents of the several rooms, the areas of exposed or outer wall and window surfaces, and the material of which the outer walls are built, whether of wood, brick, or stone. A large ground plan, e.g., precludes heating with hot air, unless a fan or blower is used, or many furnaces are employed. The character and area of the outer walls of the buildings have an important bearing upon the amount of heat lost by passage through them, although usually constructed to a certain standard. The choice of fuel depends largely upon local prices, but there are other important considerations, such as the smoke nuisance from soft coal, which may be (but often is not) avoided with large plants, but cannot be avoided in most plants for heating private residences. In the design of a specific heating plant the relation of grate to exposed wall and window surface of the hot air furnace, steam boiler, or hot-water heater must first be considered, having in mind the fuel and the type of furnace or boiler to be employed. Next comes the relation of the heating surface to the radiating surface, when steam or hot water is used, and finally the proportion of the radiating surface to the heat losses of the building. Any skimping on the various proportions named means either insufficient warmth in very cold weather, or overworking the heating apparatus—a practice which is wasteful of fuel, may injure the heating plant, and, worst of all, be a menace to health. The foregoing factors in the choice or design of heating apparatus are by no means the only ones, but are sufficient to show the technical nature of many of the problems involved, and the desirability of intrusting the solution of the latter to persons of skill and experience. In fact, the possible savings in fuel and doctor's bills are so great, to say nothing of matters of comfort and convenience, that a thoroughly competent engineer or architect may well be consulted in the selection, or design, and installation of heating plants for all buildings, from moderate-sized residences up. For all but very small heating plants, and for all systems of ventilation, this will be essential to the securing of the best possible result.

Central Heating Plants are employed to heat a number of buildings from a common source. Steam or hot water is conveyed from the central station to the several buildings through underground pipes. Within the buildings the heat is distributed in the same manner as when generated on the premises. Hot water must be returned to the central station, but the condensed steam is drawn out of the system in each building and discharged into the sewer or returned in a separate pipe to the boiler plant when possible. By first passing the exhaust through an economizer indirect heating and ventilation may be afforded. The central station equipment consists of boilers for steam and heaters for hot water, or else utilizes the exhaust steam from electric light and power stations, as explained below. The large size and greater efficiency of the central station, as compared with isolated plants for private heating, results in economy in construction and operation, in addition to which there are the savings due to the use of cheaper fuel and automatic devices for feeding the coal to and removing the ashes from the furnaces. The consumer reduces his fire risk, avoids the dirt and dust incident to isolated heating, the bother of getting coal into and ashes out of his cellar, and all possible vitiation of the air of his house by furnace gases. The community at large may be benefited by a marked reduction in both the ashes and the smoke nuisance, the latter being of great possible importance where soft coal is used for domestic fuel. Finally, the consumer may be assured of an equable temperature, night and day. As an offset to the economy of central heating, there is the cost of installing and maintaining the distribution system and of making good the losses of heat in transmission. Then it must be remembered that the care of isolated heating plants involves, oftentimes, no extra expense for labor, since they are tended by some member of the family, or some employee whose time is not fully occupied.

Central heating plants, for colleges and other institutions having groups of buildings, were constructed previous to 1880. A few plants were also installed at an early date in cities, notably New York and Detroit. Such plants received a great impetus when there came into vogue the utilization, for this purpose, of the exhaust steam from electric lighting and power plants. The occasional early installations were most frequent where a number of large customers could be secured near the station, particularly if steam could also be sold for power purposes. The latter was quite possible, since live steam was supplied to the mains, and reduced in pressure at the premises to be heated. Since 1895 many heating installations have been added to central electric-lighting and power plants. Although originally started as an experiment in many details, this departure has extended considerably. The combination adds stability to both the electric and the heating industry: (1) by enabling the former to utilize a large percentage of the heat value of the fuel, which would otherwise go to waste; (2) by saving the entire fuel bill of the latter, so long as the exhaust steam is sufficient for the heating demand; (3) by making it easier to secure customers for both current (light and power) and heat, since many possible consumers either went without electric light and power or maintained isolated plants because they required a steam plant for heating purposes. On the other hand, where the exhaust steam is used

for heating, noncondensing engines, with lower efficiency than condensing, are generally employed. At present the majority of electric stations use condensing engines, so they are at liberty to operate the more efficient condensing engine as a means of utilizing a portion of their exhaust steam and a central heating installation to utilize the whole of it.

Station Equipment for central plants is much the same as for isolated ones, only on a larger scale. When combined with electric plants, live steam must be made available when the demand for heat is greater than can be supplied by the exhaust steam. In such cases the pressure of the live steam is reduced before admitting it to the mains. Back pressure on the engine must be eliminated as far as possible. This may be effected, at times of low demand for exhaust steam, by wasting a part of the exhaust. If hot water is the heating medium, the exhaust steam is passed through a heater, then condensed, and the warmed water distributed by pumping.

Distribution Systems consist of supply pipes for the steam or hot water and return pipes for the latter, and corresponding branches, or services, for the several consumers, all of which must be carefully installed to prevent loss of heat in transmission. The pipe is generally of wrought iron. Special provision must be made for expansion and contraction. Expansion joints of the Holly type are known as *variators*. They are made without packing, both to save the trouble and expense of renewal and to diminish the number of manholes. Insulation is secured in a variety of ways. One of the means of insulation first employed was bored pine logs. The large pipe is often inclosed in regular compartments, formed of brick side walls and plank tops. The space between the walls and the pipe is packed with some nonconductor of heat, in addition to which the pipes may be wrapped with asbestos felt. More expansion joints, better insulation, and more thorough protection against ground water are required for steam than for hot-water pipes, on account of the higher temperature and consequent greater heat losses of steam and also to prevent condensation. Inside the building line there is a shut-off valve, and beyond that there may be a reducing or a regulating valve, to maintain the pressure at the desired point, regardless of its amount or variation in the street pipes. Where the steam is sold by direct measurement, a steam meter is applied to the entering steam. A hot-water meter on the main waste pipe leading to the sewer is often employed.

In the case of heating by hot-water circulation the temperature, rather than the volume, of the water is increased when more heat is required. The temperature in hot-water systems is sometimes regulated at the central station and sometimes it is left to the customer. In either case the regulation may be effected by a thermostat. In fact, thermostats may be employed to a greater or less extent on nearly all systems of heating, isolated as well as central. The charges for central heating are most frequently based on the service for a whole season, modified by either the radiating surface supplied or the cubical space which that surface is designed to heat.

VENTILATION

History of Ventilation. Although special openings were left in the roofs of Roman build-

ings for the escape of air, their object was to regulate the temperature rather than the air supply of the building. Later the necessity of securing a supply of fresh air in mines served to call attention to the necessity of ventilation independent of heating. In the sixteenth century Georg Agricola (q.v.) wrote a treatise, *De Re Metallica*, in which he describes the methods employed to ventilate the mines of Saxony and Bohemia.

In France ventilation was formerly studied chiefly from the standpoint of securing a fresh-air supply for hospitals. In 1843, according to Pecht, there was but one hospital in France having a regular ventilating apparatus. In 1853 two systems were tried in the construction of the Hospital Lariboisière—one of aspiration, the other of inflation. Both were unsatisfactory because neither of them supplied a sufficient quantity of fresh air. In Germany, as in France, the early history of ventilation is connected with hospital construction. In England attempts at securing a fresh-air supply began much earlier and consisted in repeated attempts to secure ventilation for the English Houses of Parliament. In 1660 Sir Christopher Wren made the first attempt, and the history of the subsequent efforts made would be an epitome of the advance of the science of ventilation. In 1856 the General Board of Health of England appointed a commission to inquire into the best methods of warming and ventilating dwellings. About the same time, owing to the heavy losses by sickness in the Crimean War, the question of barracks-room ventilation was under discussion.

In the United States, as in England, the early attempts at ventilation were directed towards securing fresh air for the meeting places of legislative assemblies, the first report on the subject having been made on April 2, 1849.

Ventilation has for its object the maintenance of a pure-air supply indoors. This can be effected only by the introduction of the proper amount of pure air, which involves the removal of the foul air, since these two processes go together. One of the objects of ventilation is to "condition the air" and render it of best quality for respiration. Considered from the standpoint of the air in the room, ventilation removes or dilutes such impurities as have been introduced by man, regulates the moisture, cools the air, and may be instrumental in warming it, although the latter, properly speaking, pertains to heating. It alone can give no better air than that surrounding the building to be ventilated.

Dust removal is an important feature in ventilation. In the latest plants dust is removed by a system of washing with sprays, followed by means for removing the excess water. In some plants the humidity is maintained at any desired point by an automatic regulator. Filter plants for removing dust are still used to some extent, but are open to many objections and are only partly successful. Bacteria are nearly all removed by the processes of air washing. The moisture of the air supply may be lessened by drying, and air which is too dry may be moistened by spraying with water.

The chief impurities in the air of houses and public-assembly rooms are those thrown off by the lungs and skin. Next in importance are the gaseous products of the combustion of oil and gas for lighting, and of these two substances and coal when used for heating. Dust, also, is found everywhere—some being due to the processes al-

ready mentioned, some being brought in on the feet and clothes, or blown in through doors and windows, while large quantities of it are due to the wear and tear of clothing, carpets, and the like. In shops and factories the air is contaminated in most of the ways already mentioned, some of which, like dust, may be intensified many fold. In addition, the air of manufactories is liable to be made impure by the gases given off by the chemicals employed or produced or by the decomposition of organic matter.

The number of hours in a day during which a room is occupied, as well as the number of occupants in proportion to the cubical contents of the room, has a most direct bearing upon the vitiation of the air and the means to be employed to rectify it. Thus, dwellings of the better class have some rooms continuously occupied for one-half the day, and other rooms for the remaining half, the air space to each person being large. Churches may be crowded, but generally only for one to two hours during the week. School buildings, legislative assemblies, and factories may be crowded for hours together, then as completely emptied as churches. Hospital wards are liable to be fully and continuously occupied, in addition to which there are various well-known special ways of contaminating the air of hospitals. Wherever rooms are used intermittently, it is generally possible to give them a thorough airing by throwing the windows wide open; but, beneficial as this may be, its effect is not permanent, and it is often neglected, particularly in cold weather. Ventilation through open windows is not effective so far as introducing air is concerned, but it serves a useful purpose in reducing temperature and exerting a controlling effect on humidity. In the modern ventilating systems air is usually introduced positively by a fan or blower. Such systems are now usually so designed as to be efficient with the windows open. Even in the summer time the ventilation of crowded assembly halls and hospitals cannot be left with safety to open windows, since the air may be stagnant outdoors as well as in. In capacious dwelling houses, with walls, doors, and windows not too tight, the natural interchange between the inner and outer air may suffice during a large part of cold weather, while open doors and windows will give as much fresh air in summer as it is practicable to provide; but there will be times in cool weather when even these favorable conditions will be lacking.

It is pretty clearly shown by the foregoing that ventilation should be made an essential feature in the design and use of practically all classes of buildings in which people live, work, are instructed, or amused. The quantity of air to be supplied and removed, and the proper means of doing both, can be best understood after considering in more detail the nature and amount of the chief impurities which it is desired to avoid. The vital principle of air is oxygen. Normal air contains about 20.9 per cent, in volume, of oxygen, 79 per cent of nitrogen and argon, and 0.1 per cent of other substances, including some 0.03 or 0.04 per cent of carbonic acid (carbon dioxide). After having been passed through the lungs the oxygen has been diminished to 16 per cent, and carbonic acid has been increased to 4.4 per cent of the total volume, the nitrogen rising slightly to some 79.5 per cent. This exhaled air is rapidly diffused throughout the room, so, unless the room is crowded, the percentage of total oxygen is not greatly diminished

for some time. Associated with the diminished oxygen there is also an increase in watery vapor, in the effete and putrescible organic contents of the air, and possibly in the number of harmful bacteria which it contains. Another cause of diminished oxygen is the burning of oil and gas for illumination. As an index of the impurities present, and of the diminution of oxygen, carbonic acid has been chosen. For convenience it is generally expressed in parts per 10,000, thus giving 4 parts per 10,000, instead of 0.04 per cent, as the normal average amount in the air. In the purest air the carbon dioxide may fall to 3.2 parts; in cities it may be normal at 4.5 parts; in occupied rooms it may go to 33 parts per 10,000, or even higher.

Recent investigations tend to prove that an increase in carbon dioxide contents to 4 or 5 per cent, accompanied with a corresponding decrease in free oxygen, is not detrimental for purposes of respiration. The most harmful effects due to bad ventilation are high temperature and lack of circulation. High temperature with excessive humidity exerts a depressing action on the heart and often causes faintness. The tendency of modern ventilation is to reduce the supply of air per person over the previous requirement, to condition such air as to dust, humidity, and temperature, and circulate such air to every portion of the room. It has been found desirable to supply each person in a room with 30 cubic feet of fresh air per minute, or 1800 cubic feet per hour.

After a careful consideration of the subject, including a weighing of authorities, Dr. John S. Billings, in his work on ventilation, gave the following table:

	Cubic feet of air per hour
Hospitals.....	3,600 per bed
Legislative assembly halls.....	3,600 per seat
Barracks, bedrooms, and workshops....	3,000 per person
Schools and churches.....	2,400 per person
Theatres and ordinary halls of audience....	2,000 per seat
Office rooms.....	1,800 per person
Water-closets and bathrooms.....	2,400 each
Dining rooms.....	1,800 per person

No allowance should be placed "on leakage through crevices or on bad construction of the building as a source of air supply," and where it is "assumed that the walls will be rendered more or less impermeable by paper and paint." Dr. Billings also emphasized the fact that the whole ventilating and heating system must be proportioned in accordance with the figures given, or any modification of them which may be adopted, including all air ducts, inlets and outlets, blowers, and heat-generating apparatus.

Ventilation may be divided into two classes, gravity and mechanical. *Gravity ventilation* is based on the fact that warm air is lighter than cold, and hence is overbalanced and replaced by the latter. In cold weather the inner is warmer than the outer air, so, if sufficiently capacious inlets and outlets are provided, the warm, foul air will be displaced by cool, fresh air. But in warmer weather the differences in temperature, and consequently in pressure, are less, and the interchange lags. The currents in the ventilating ducts may then be aided by a slight heating, which may be effected in a variety of ways, such as a light fire, or even a gas jet or jets in the base of the ventilating shaft; or a coil of steam or hot-water pipes, where feasible. Even if there be no ventilating flues, there will be a more or less constant inter-

change of air through the walls and the cracks around chimneys and doors; but in well-constructed houses this may be very small in fairly cold weather, and practically nothing in mild weather, while for schools, churches, and the like it is of little consequence except on very cold or windy days. Natural ventilation, for the reason stated, is frequently unreliable and is serviceable only for small buildings.

Mechanical ventilation, as the name implies, depends upon machinery for the movement of the air. It may be used to introduce fresh air, to remove foul air, or both. Air introduced for ventilating purposes must be warmed when necessary to provide a uniform temperature in the rooms to be heated; this is accomplished by placing radiating surfaces in the passage of the entering air. The heating surface for warming the rooms can be of the direct or indirect character. The air introduced must in all cases be at the same constant volume, which requirement is met by passing a variable portion of the air over an indirect heater and permitting the other part to pass into the room unheated. With either indirect or direct heating an air blast has the great advantage of perfect control of the fresh-air supply. If a hot-air blast is employed, both heating and ventilation are under equally good control.

The most common mechanical aids employed are blowers or fans, placed in the air ducts, and either forcing the air ahead of them or creating a vacuum into which it rushes. The terms *plenum*, or inflating, and *vacuum*, or aspirating, are applied, respectively, to blowing in and to sucking out air. The fans and the pipes leading from the same must be perfectly proportioned for the work to be done. Engineering information respecting the designs of fans or blowers and also pipes for conveying the air is now well disseminated among fan engineers, and there is no uncertainty as to power needed, resistance in pipe line, or capacity in cubic feet per minute in a well-engineered plant. The first cost of a mechanical ventilating system is not expensive, and where the law requires a specified air delivery it is usually installed.

The proper elevations for introducing fresh and removing foul air are still mooted questions. It is certain, however, that the relation of the inlets and outlets should be such as to give the most perfect diffusion of the fresh air and to leave no stagnant foul air in the rooms, which will also tend to avoid heavy drafts. Many authorities favor the location of the inlets and outlets on the same side of a room, the inlets to be above the heads of the occupants. The theory is that the fresh air will ascend to and pass along the ceiling, and that the foul air will pass along the lower part of the room and then out. One of the chief objections to locating inlets, for either heating or ventilation, in the floor is that the ascending air carries up floor dust with it; and another is that unless the inlets are very numerous the inrush of air will be unpleasant to those near by.

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ter on methods of air analysis; Putnam, *The Open Fireplace in All Ages* (Boston, 1881); Dwyer, on "Stoves and Heating Apparatus," in *One Hundred Years of American Commerce* (New York, 1895); *Proceedings American Society of Heating and Ventilating Engineers* (ib., 1894, 1913); Allen, *Notes on Heating and Ventilation* (ib., 1905); Jones, *Heating by Hot Water: Ventilation and Hot Water Supply* (ib., 1905); Thomas, *Ventilation, Heating, and Lighting of Dwellings* (London, 1906); C. H. Innes, *The Fan* (ib., 1905); id., *Air Compressors and Blowing Engines* (ib., 1906); Hoffman and Raber, *Handbook for Heating and Ventilating Engineers* (Lafayette, Ind., 1910).

HEATON, AUGUSTUS GEORGE (1844-). An American historical and portrait painter. He was born in Philadelphia, Pa., and was the first student from the United States admitted to the ateliers of painting of the Ecole des Beaux-Arts, Paris (1863). He studied under Cabanel there and afterward became a pupil of Bonnat. Among his works are: "Washington at Fort Duquesne," Union League Club, Philadelphia; "The Recall of Columbus," bought by the United States government for the Capitol, and engraved on the 50-cent stamp of 1893; "Hardships of Emigration," engraved on the 10-cent stamp celebrating the Trans-Mississippi and International Fair, Omaha; "The Promoters of the New Congressional Library" (1888); "Baron Steuben at Valley Forge" (1907). His best-known portraits include those of Bishop Bowman (Cornell College) and Paul Tulane (Tulane University).

HEATON, SIR JOHN HENNIKER (1848-1914). An English public official, known as the "father of universal penny postage." He was born at Rochester, Kent, and was educated at the Kent House Grammar School, and at King's College, London. He became a landowner and part proprietor in newspapers in Australia, represented New South Wales at the Amsterdam Exhibition in 1883 and at the Indian Colonial Exhibition in 1886, and was delegate of the Tasmanian government to the Berlin Telegraph Conference in 1885. With his entrance into the British Parliament, where he served as Conservative member for Canterbury from 1885 to 1910, Heaton became widely known as a persistent advocate of penny postage, and the final success of the Imperial penny postage scheme in 1898 was largely due to his efforts. Moreover, he introduced telegraph money orders into England and a parcel post between France and England; and in 1907 he secured the Anglo-American penny postage rate, which went into operation in the following year. He was created Baronet in 1912. He published: *A Short Account of a Canonization at Rome; The Manners and Customs of the Aborigines of Australia; Australian Dictionary of Dates and Men of the Time*.

HEATON, JOHN LANGDON (1860-). An American editorial writer. Born at Canton, N. Y., he graduated from St. Lawrence University in 1880. He joined the staff of the *Brooklyn Times* in 1881 and became known after 1899 as an editorial writer for the *New York World*. He is author of *The Story of Vermont* (1889); *Stories of Napoleon* (1895); *The Quilting Bee* (1896); *The Story of a Page: Thirty Years of Public Service and Public Discussion in the Editorial Columns of the New York World* (1913).

HEAT STROKE, SUNSTROKE, or THERMIC FEVER, also called INSOLATION, HEAT APOPLEXY, SUN FEVER, and SIRIASIS. The effect produced

upon the body by exposure to intense heat, whether from the sun, from furnaces, or from the atmosphere. Another form of affection resulting from exposure to heat is HEAT EXHAUSTION, or HEAT PROSTRATION, in which there is a very different set of symptoms. In the commoner, mild form of heat prostration, the patient exhibits exhaustion, weakness, faintness, and occasionally nausea; in the severe form, pallor, great depression, collapse, and loss of consciousness, with a subnormal temperature dropping sometimes as low as 95° F. All cases recover in a few hours. Heat stroke, on the contrary, usually comes on abruptly or is preceded by some weakness and anxiety. Unconsciousness supervenes early, with flushing of the whole body and profuse sweating, delirium or even mania, vomiting and diarrhoea, and a temperature of 108° to 115° F. Death may ensue speedily, from cessation of respiration or from cerebral anæmia; the sweating ceasing, the full rapid pulse becoming imperceptible, and asphyxia, coma, or convulsions following. Laborers in the open, laundresses in an overheated kitchen, bakers, and firemen in engine rooms, present most of the cases. Many cases occur at night among those exposed to indoor heat who have not been in the sun at all; others who have been in the sun during the day are stricken at night in the vitiated atmosphere of crowded tenement-house rooms, after drinking alcoholic beverages and eating hearty meals.

Two and six-tenths per cent of the heat produced by the chemical metabolism within the body is lost from the body in warming substances taken in as food and drink, 2.6 per cent in warming the inspired air, 14.7 by evaporation, and 80.1 per cent by radiation and conduction from the skin. With the inspired air hotter than the body, radiation and conduction abolished, and evaporation rendered impossible in an atmosphere nearly saturated with vapor, the constant production of heat by muscular action must result in a great strain upon the inhibitory cerebral centres that preside over heat regulation. Any previous ill health, alcoholic indulgences, or other excess is followed by a failure of these centres under such strain, and heat stroke is the result. The combined influence of heat and auto-intoxication constitutes the cause of heat stroke, with the possibility of a germ poison. Sambon, of Rome, in a paper on heat stroke published in 1898, asserted the infectious character of the disease as produced by a specific germ. He classes it with yellow fever, dengue, and other tropical affections—all germ diseases requiring high atmospheric temperature for their development. This view has yet to be substantiated. Van Gieson, of New York, however, during an extensive examination of brains of victims of heat stroke, found changes in the chromophilic plaques of the ganglion cells. These plaques were changed in shape, fewer in number, replaced by fine dust, or entirely absent. Van Gieson believed the condition to be due to a toxic degeneration, and the changes in the ganglion cells similar to those produced by alcohol, lead, and the microbe poisons; and that heat stroke is "a species of auto-intoxication, the neural symptoms finding a clear and definite explanation in the acute parenchymatous degeneration induced by an autogenous poison."

Siriasis is a specific form of heat stroke, not depending alone upon an elevated temperature, but probably of microbic origin and developing

only in the presence of high atmospheric temperature and certain local conditions. It is known in Africa, Asia, and Australia, and occurs to some extent on the Atlantic coast of the United States. According to Manson, the mortality among English troops is about 25 per cent of those who develop the disease. Post-mortem examination shows that the heart is remarkably rigid, the blood unusually fluid and acid in reaction; the viscera are engorged with venous blood. Rigor mortis occurs very soon after death.

The treatment of heat prostration, the mild form of thermic exhaustion, consists in securing elevation of the temperature of the body by the use of external heat and in supporting the heart by the use of alcoholic stimulants, strychnine, and similar drugs. In heat stroke, on the other hand, rapid reduction of temperature must be secured at the earliest possible moment. Sprinkling ice water over chest and body or rubbing with ice is imperative. It has been urged that ambulances carry ice and a sprinkler, that treatment may begin as soon as the patient is reached and continued during his trip to the hospital. Here the patient is placed on a Kibbé cot or a Walton bed, and the cold affusion is continued till the temperature falls to 102.5° F. He is then rubbed dry, removed to a bed and wrapped in warm blankets, with as little disturbance as possible during the operation. If the temperature rises, the ice-water treatment is to be repeated. Acetanilid and antipyrine have been employed as antipyretics, adjuvant to the ice water, but their use is not without danger. Venesection has been practiced with great relief in some cases. Ether or chloroform has been used to control convulsions, anesthesia being continued for several hours. Morphine is very valuable in many cases. Flagellation of the extremities, sinapisms to the legs, stimulating rectal injections, atropine, digitalis, and nitroglycerin all have been used, according to special indications, in addition to the drugs mentioned.

The sequelæ of heat stroke possible are headache, tinnitus, deafness, insomnia, impaired memory, insanity, epilepsy, paralysis, meningitis, and many functional irregularities, especially of the heart. Heat stroke is often preventable. Laborers should dress in thin, loose clothing in place of woolen; sleeping rooms should be ventilated, stimulants should be avoided, shelter from the sun should be provided when possible, and plenty of water should be drunk by those exposed to the heat. Troops, as well as gangs of laborers, should be inspected, and when sweating ceases and the skin becomes hot and dry, relief from duty, rest, and a cold bath should be ordered.

Consult: Wood, *Thermic Fever or Sun-Stroke* (Philadelphia, 1872); Horton, *Diseases of Tropical Climates: Sun-Stroke* (London, 1879); Borely, *Le coup de chaleur* (Paris, 1884); Manson, *Tropical Diseases* (4th ed., New York, 1907); Lyth, *Studies on the Influence of Thermal Environment on the Circulation and the Body Heat* (London, 1913).

HEAT TREATMENT. See HOT-AIR TREATMENT.

HEAUTON TIMORUMENOS (Lat., from Gk. *ἐαυτὸν τιμωρούμενος*, *heauton timoroumenos*, the self-tormentor). A comedy by Terence, based on a play with the same title by Menander and first performed in 163 B.C. In it Terence developed the intrigue of the original into an ex-

travagant plot. The play contains the famous line, "Ilomo sum; humani nihil a me alienum puto."

HEAVEN (AS. *heofon*, OS. *heban*, lecl. *hifann*; connected with Goth. *himins*, lecl. *himinn*, OS. *himil*, OHG. *himel*, Ger. *Himmel*, heaven, ceiling). In theology, that portion of infinite space in which the Lord of all things, although present throughout all, is supposed to give more immediate manifestations of His glory. Of the belief in the existence of some such special scene of the presence of the Deity, most of the known religions of the world, ancient and modern, present abundant evidence. Chthonic gods reside in the earth; sun gods were often thought of as residing in the west, or in an underworld through which the sun passes at night (Egyptian religion); the "lofty" gods were sometimes conceived to dwell on some high mountain, like Olympus or the Himalayas; but more often the home of the gods was placed in the sky. In addition, however, to the idea of its being the special scene of God's glory, the word "heaven" also designates the place, or the state or condition, of the blessed spirits, and of the souls of just men who are admitted into the participation or the contemplation of the divine beatitude. In the religious system of the Greeks and Romans none were supposed to be admitted to the heaven of the gods except the deified heroes or demigods; but with them the elysian fields (q.v.) of the lower world held, morally speaking, the same place in relation to the great doctrine of the divine retribution for the good and evil actions of human life. The elysium of the classic mythology is in all essential respects the natural equivalent of the heaven of the just. The Pythagorean doctrine of metempsychosis approached nearer to it in form; for it supposed that the soul, after the purification of successive transmigrations, was elevated to a higher and incorporeal condition in the cosmos. The doctrine of Plato was still more explicit. It may be said in general that all the philosophical systems which included the belief of the immortality of the soul also involved, at least in substance, the idea of a state of happiness as the reward of a virtuous life. The ideal of happiness of the heaven of these various creeds differed widely. The delights of the classical elysium were, at all events in part, delights of sense. The German warrior had his war horse and his armor laid in his grave, that he might be able to pursue, after death, the fierce enjoyments in which he had delighted while in the world of the living. The paradise of the Indian hunter is but a richer and more extensive hunting ground. *The Testament of the Twelve Patriarchs* (see APOCRYPHA) contains a very curious exposition of the same notion.

The Hebrews conceived of the sky as a solid firmament, upholding the celestial reservoirs of water. (See FIRMAMENT.) They invariably used a plural noun for heaven, indicating a belief in a plurality of heavens (Gen. i. 1; Deut. x. 14; 1 Kings viii. 27; Ps. cxlviii. 4). The conception of seven heavens, based on a division of the celestial spaces among the seven planets, appeared before the Christian era, perhaps borrowed from the Babylonians. In the beginning of the Christian era this idea finds expression in the Slavonic Enoch (q.v.) and some parts of the Testaments of the Twelve Patriarchs, where the character of each of the seven heavens is described in detail. Substantially the same

conception is found in the Ascension of Isaiah, the Apocalypses of Moses, Ezra, John, Isaac, Jacob, and the Acts of Callistratus. In view of these facts it becomes probable that in the Pauline Epistles the heavens are also assumed to be seven in number. Thus, paradise is in the third heaven in 2 Cor. xii. 2, 3, as in Slavonic Enoch viii; in Eph. vi. 12 there are spiritual hosts of wickedness in the heavens; in Col. i. 20 the kings in heaven as well as on earth have to be reconciled to God; in Heb. iv. 14 the great high priest passes through the heavens. The Jewish apocalyptic sketch in Rev. xii describes a war in heaven, between Michael and his angels and Satan and his angels. While ultimately the old Semitic doctrine of seven heavens and of battles and places of punishment in one of these heavens was suppressed in Christian thought, it continued in the religious systems of the Mandaeans (q.v.) and in the Koran. As the storm cloud was the celestial abode of Yahwe, Israel's god, so the translation of such heroes as Enoch and Elijah originally implied only that they were carried alive from earth to be with Him among the clouds. But as the conception of the Deity expanded, His heavenly dwelling place began to occupy more fully the imagination. In the Ethiopic Enoch (see ENOCH, BOOK OF) and the Slavonic Enoch this antediluvian patriarch describes minutely the heavens through which he is permitted to pass. The hope awakened through the Persian doctrine of resurrection, of a release from Sheol, in the case of all Israelites or of the pious in the nation, offered the possibility either of a new life on earth or of a translation to heaven. In the recorded sayings of Jesus there is no description of heaven. His answer to the question of the Sadducees touching the resurrection seems, however, to imply that He considered those who had been accounted worthy of being raised from the dead as living in heaven, being like angels, neither marrying nor being given in marriage (Luke xx. 33 et seq.). The idea of heaven in the early Church was simply the current Jewish idea, and the relation of the dead to it was, as in Judaism, not wholly consistent. The dominant view seems to have been that, until the return of the Lord upon the clouds of heaven to raise the dead, those who had died were asleep, and that they would be suddenly awakened to be given their new bodies, after which they would reign with Him in the Messianic Kingdom. But, largely under the influence of Greek thought, other conceptions prevailed. The fate of the patriarchs, prophets, and pious men of the old dispensation naturally occupied much attention and led to the idea that they were detained in a preparatory abode which the fathers called *limbus patrum*, awaiting the advent of the Redeemer. The general belief of Christians has been that since the resurrection of Christ the just who are free from sin are admitted immediately after death into heaven, where their chief joy consists in the unclouded vision of God. But especially since the sixteenth century some have returned to the millennial views of a part of the early Church. (See MILLENNIUM.) Traditional theology maintained that since the coming of Christ no human being can be admitted into heaven without some identification with Him or His Church, through personal faith, or the sacraments, but there has been a growing belief that Heaven would not be denied to unbaptized infants, pagans, or others having had insufficient

opportunities of embracing the gospel, and even that all souls would ultimately reach heaven. Consult: Smend, *Alttestamentliche Religionsgeschichte* (Freiburg, 1899); Beyschlag, *New Testament Theology* (Edinburgh, 1899); Morfill and Charles, *Book of the Secrets of Enoch* (Oxford, 1896); Atzberger, *Christliche Eschatologie* (Freiburg, 1890); Charles, *Eschatology* (London, 1899); Kennedy, *St. Paul's Conception of the Last Things* (New York, 1905). See ESCHATOLOGY; IMMORTALITY.

HEAVES (from AS. *hebban*, Goth. *haffjan*, OHG. *heffan*, Ger. *heben*, to lift), BROKEN WIND, or ASTHMA. A chronic disease or unsoundness of equines, characterized by a hurried, wheezy breathing (which is increased by close weather, a full stomach, or exercise), by a double lifting of the flank with each expiration, by a weak dry cough (which is easily excited by a drink of cold water), and by a marked disorder of the digestive organs. The disease, which results from faulty feeding and working, is most commonly due directly to a chronic alveolar bloating of the lungs. It develops, as a rule, after the animal has been used a long time for heavy work, either pulling or running, and is more rarely due to continued inspiratory or expiratory dyspnea in chronic diseases of the air passages. Feeding on clover hay or straw, too bulky and nonnutritious food, and keeping the horses in a dusty atmosphere or badly ventilated stable predispose to heaves. Horses brought from a high to a lower level are also predisposed.

After death, if the organs are examined, very few changes are found in recent cases, but if the animal has been broken-winded for a long time the changes are well marked. The lungs are paler than natural and of much less weight in proportion to their volume. The walls of the small bronchial tubes and the membrane of the larger tubes are thickened. The right side of the heart is enlarged and its cavities dilated. The stomach is enlarged and its walls stretched. The important change found in the lungs is a condition known as pulmonary emphysema.

The treatment of heaves is very unsatisfactory, and a palliation of the symptoms by keeping the alimentary canal in proper order, administering occasional purgatives, and feeding on a proper quantity of the best oats, which should always be bruised, are all that can be recommended as remedies; turning out to pasture, or feeding on cornstalks or other laxative food, gives relief. Only the best quality of hay should be fed, and that in small quantities. Some veterinarians have vaunted their power to cure this disease and recommend large doses of camphor, digitalis, and opium; but these potent narcotics only operate for a very short time, and as their effects pass off the symptoms return, often with increased severity. It is generally conceded that when established the disease is incurable. Horses very frequently drop down exhausted when at hard work and die either from congestion of the lungs, hemorrhage, or simple suffocation.

Consult F. Hutyra and J. Marek, *Special Pathology and Therapeutics of the Diseases of Domestic Animals*, vol. ii (Chicago, 1913), and J. Law, *Text-Book of Veterinary Medicine*, vol. i (Ithaca, N. Y., 1905).

HEAVY FIELD ARTILLERY. The artillery intermediate in mobility and power between *light field artillery* and *siege artillery*. It is

only within recent years that the distinction and difference between the functions of the three types has been clearly recognized and defined. The development of a mobile weapon more powerful than the 3-inch fieldpiece, the adopted type for the divisional artillery of all armies, was brought about by the necessity for reaching troops under cover of modern hasty intrenchments and fieldworks. Improvement in the rapidity of construction and in the strength of such works, which can now be thrown up almost overnight, was met by the production of more powerful guns, mortars, and howitzers designed to breach them. In order to be available whenever needed such artillery had to have the mobility of the army to which it was attached, i.e., the rate of march of infantry. As a rule, heavy field artillery includes such guns, mortars, and howitzers as may be moved at a walk by a team of eight heavy horses over ordinary roads. The weight behind the team varies considerably in different armies, but is always greater than the 4000-pound load, the average behind the six-horse team of light artillery. Calibres vary from 4.7 inches to about 6 inches, both inclusive. Weights of projectiles vary from 60 pounds to about 120 pounds, the latter being the weight for the United States 6-inch howitzer. The loads behind the team vary from 4800 to 10,000 pounds. The lighter load (4800 pounds) is obtained for the French *Rimailho* 6.1-inch field howitzer by carrying the howitzer itself as a separate load. This piece therefore has great mobility and can move at a trot, but has the disadvantage of delay in getting into action, as it has to be assembled on its carriage after reaching the firing position. The tactics of heavy field artillery, being a comparatively recent development, have not as yet been so clearly defined as those of the 3-inch fieldpiece. To Germany, primarily, belongs the introduction of these powerful weapons, which played a distinguished part in the European War of 1914. In both the Balkan War of 1912 and the European War of 1914 these guns and howitzers were used not only to breach fieldworks and to attack overhead cover, but to assist the safe deployment of the lighter field guns. On account of their great range it was also possible, without change of position, to reach any point of a very wide sector of fire, and often, by moving the guns close in, to secure an enfilading fire on the trenches and gun positions on the hostile flanks. For cannon above 6-inch calibre, see SIEGE ARTILLERY. See ARTILLERY; FIELD ARTILLERY; HOWITZER; MORTAR; ORDNANCE.

HEAVYSEGE, CHARLES (1816-76). A Canadian poet, born in Liverpool, England. For some time after his arrival in Canada (1853) he followed his trade, that of a cabinetmaker, but later branched off into wood carving, and then went into journalistic work for the *Montreal Witness*. After publishing anonymously *The Revolt of Tartarus* (1853) and a volume of sonnets, he produced (1857) *Saul*, a dramatic work of remarkable originality and power, a tragedy, in three parts of five acts each. This was followed by *Count Filippo*, or *the Unequal Marriage: A Drama in Five Acts* (1860); *The Dark Huntsman and The Owl* (1864); *Jephthah's Daughter* and a novel called *The Advocate* (1865). For a critical estimate of *Saul*, see "English-Canadian Literature," by Thomas Guthrie Marquis, in *Canada and its Provinces*, vol. vi (Toronto, 1913-14).

HEBBEL, hēb'el, FRIEDRICH (1813-63). A German, one of the greatest of modern dramatists. He was born in Wesselburen (at that time Danish) in Schleswig-Holstein, of poverty-stricken parents. His childhood was hard and cheerless. His father, embittered by failure and want and almost hating his children, died when Friedrich, still with little schooling, was about 14 years old. His mother, a servant, had a good heart, but a bad temper. After his father's death the poet became office boy to a sort of town clerk and petty magistrate, who gave him at least bread to eat and books to read. The literary efforts of this period—tales, poems, and dramatic fragments—show the influence of Hoffman, Schiller, the Schlegels, and Tieck. His youthful publications in the *Neue Pariser Modeblätter* of Hamburg attracted the attention of the editor, Amalia Schoppe, who found means to bring the young poet to Hamburg in February, 1835. Here he worked hard on stories and essays, began his famous diary, and became enamoured of the poor but faithful seamstress Elise Lensing. In order to study law he set out on foot for Heidelberg in March, 1836; but, having no formal preparation, he could not matriculate, but was, however, permitted to attend lectures, first on law, and then on literature and philosophy. Poverty and lack of preparation hampered him. In September he walked to Munich. Schwab and Uhland, whom he saw on the way, helped him but little. At Munich, where he heard Görres and Schelling, only the scant savings of Elise Lensing kept him from actual starvation. But he read widely and well during those dreadful months and learned from bitter experience what turned out to be the keynote of most of his tragedies—that the tragic in life is very often due rather to a conflict between the idiosyncrasies of an individual and the world than to any moral transgression. His Munich writings were mostly sombre lyrics. Another long, hard walk from Munich to Hamburg in the early spring of 1839 nearly killed him, but Elise nursed him back to life. At a suggestion got from reading Gutzkow's (q.v.) drama *Saul*, he completed, in January, 1840, his first important drama, *Judith*, a realistic dramatization in prose of the apocryphal story of Judith and Holofernes. Through Amalia Schoppe and the Berlin actress Crelinger it was successfully given in Berlin and Hamburg. This made Hebbel a name. His next drama, *Genoveva* (1841), five acts in verse, is a subjective study of Hebbel's own personality in the character of Golo. Raupach's drama of the same name prevented its presentation in Berlin. His next effort, *Der Diamant* (1841), a comedy, was unsuccessful. Meantime Elise Lensing had borne him a son, and the young father was penniless. He went to Copenhagen, hoping that King Christian VIII would make him professor of aesthetics in the University of Kiel; but, disappointed in this, he finally secured from the King a pension of 600 thalers yearly for two years of travel. In September, 1843, he went to Paris; but his poverty and ignorance of the language prevented him from getting as much as he had hoped. The death of his son Max was a hard blow to him. But he completed his drama, *Maria Magdalena*, a three-act prose tragedy of Christianity holding fast to the letter of the moral law, begun in Copenhagen in 1844. This was the first of the modern naturalistic dramas, thus a forerunner of Ibsen's social-

problem drama. Shortly before its publication in October of that year he left for Rome. On account of worrying about Elise and his newborn son and with his habitual gloominess he got comparatively little out of his stay in Italy. In Naples he worked on his terrible dramatic fragment *Moloch*, ranking with Schiller's *Demetrius* and Kleist's *Robert Guiscard*. Late in 1845 Hebbel arrived in Vienna, too poor to appear in good society. If two noble young Poles had not given him means, he would have left Vienna in despair. But he remained, and met Christine Enghaus, a famous actress of the Burgtheater, who had already conceived a great admiration for his dramas and a strong affection for himself. Hebbel now had the difficult choice either of the faithful but poverty-stricken and ignorant Elise, mother of his children, and, as he himself expressed it, "the pistol," or of the brilliant, rich, appreciative actress, with whom a successful career was practically certain. He made the selfish choice, but the only one that could save his life as a man and as an artist. Elise was furious, but later became reconciled and lived for a time in his house. Hebbel and Miss Enghaus (died 1910) were married in the spring of 1849. He now turned to his literary work with zeal, finishing first his masterpiece, *Herodes und Mariamne* (1848), a poetic-realistic dramatization in five acts of blank verse of the struggle of two exceptional individuals, resulting in the man's becoming a mere beast and the woman's becoming a dagger of ice—a splendid exemplification of Hebbel's theory of the tragedy. This was performed with no great success in Vienna in 1849. He lived a retired life, having little to do with Grillparzer (q.v.) and Halm, and least of all with Laube, director of the Burgtheater. His journalistic efforts made him extremely unpopular in Viennese literary circles. *Agnes Bernauer* (1851) is a five-act prose dramatization of the story of the Augsburg barber's beautiful daughter, beloved of Duke Albrecht but cruelly murdered by the command of his father, the reigning Duke Ernst. Its première in Munich in 1852 was a success. His next tragedy, *Gyges und sein Ring* (1854), is a five-act verse dramatization of the familiar story found in Herodotus and Plato, of Kandaules and his wife Rhodope, by many considered a better interpretation of the problem of Ibsen's (q.v.) *A Doll's House*. This was not produced until 1889. Then came his most ambitious work, his *Nibelungen* trilogy (*Der gehörnte Siegfried*, the one-act prologue, and the two five-act dramas, *Siegfrieds Tod* and *Kriemhilds Rache*), which was not completed until 1860, and put on the stage successfully the following year, with Frau Hebbel as Brunhilde in *Siegfrieds Tod* and as Kriemhild in *Kriemhilds Rache*. The trilogy won the Schiller prize. Hebbel follows not the Norse but the mediæval version of the story, and was not altogether successful in transforming the epic into the dramatic. With his wife and daughter the poet lived winters in Vienna and summers in his country home at Orth, near Gmund, enjoying the reputation which he so richly deserved. On account of the hardships and worry of his earlier days his health broke in 1859, and he died, while at work on his drama, *Demetrius*, in December, 1863.

Among his other works may be mentioned: lyrics and ballads; the prose narratives *Anna* (1836) and *Die Kuh* (1849); the æsthetic es-

says *Mein Wort über das Drama* (1843) and *Vorwort zur Maria Magdalena* (1844); his famous diaries (from 1835); the dramas *Michelangelo* (1850) and *Julia* (1851); and his correspondence. His complete works were issued in an historical-critical edition of 22 volumes, including his diaries and his letters (1901-08). Consult: Emil Kuh, *Biographie Friedrich Hebbels* (2 vols., Vienna, 1877); Bamberg, "Hebbel," in the *Allgemeine Deutsche Biographie*, vol. xi (Leipzig, 1875-1912); Kulke, *Erinnerungen an Fr. Hebbel* (Vienna, 1878); A. Neumann, *Aus Friedrich Hebbels Werdezeit* (Leipzig, 1899); Bulthaupt, *Dramaturgie des Schauspiels*, vol. iii (Oldenburg, 1902); Georgy, *Die Tragödie Friedrich Hebbels nach ihrem Ideengehalt* (ib., 1904); R. M. Werner, *Hebbel, ein Lebensbild* (Berlin, 1905).

HEBBURN. A town in Durham County, England, on the south shore of the Tyne estuary, 4 miles east of Newcastle. It is an important industrial centre, with shipbuilding and supplementary establishments, engineering and chemical works. The public buildings include a mechanics' institute, an armory, and isolation hospital; among modern municipal improvements are a new drainage system, a public park, and electric lighting. Pop., 1901, 20,901; 1911, 21,766.

HEBE, hē'bē (Lat., from Gk. "Ἥβη). The goddess of youth, the daughter of Zeus and Hera, or, according to others, of Hera alone, the wife of Heracles after he had been deified. She was the cupbearer of Olympus before Zeus conferred that office upon Ganymede (q.v.), and she always retained the power of restoring the aged to the bloom of youth and beauty. In the cult she usually appears joined with Hera or with Heracles; but in Phlius she was worshiped as Ganymede, and at Sicyon as Dia, as one who frees from all bonds, apparently through the joys of life. Statues of Hebe are rare, but on vases and reliefs she often appears with Heracles or as cupbearer of Zeus. The representations of Hebe and the eagle are all late. Consult: Kekulé, *Hebe* (Leipzig, 1867); Preller-Robert, *Griechische Mythologie* (Berlin, 1894); and the article "Hebe," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. vii (Stuttgart, 1912). See JUVENTAS.

HEBEL, hä'bel, JOHANN PETER (1760-1826). A German dialect poet. He was born of poor parents at Basel, studied at Erlangen, and in 1808 became director of the Gymnasium at Karlsruhe. In 1805 he was appointed Church councillor and in 1819 prelate. He is chiefly known for his *Allemannische Gedichte* (poems in the Alemannic dialect of Lörrach, 1803 et seq.; with introduction by Albrecht and illustrations by Kögler, 1900), which, very favorably reviewed by Goethe in the *Jenaische Allgemeine Literaturzeitung*, made him famous. His best-known poem is *Die Wiese* (an affluent of the Rhine near Basel). He also wrote for his periodical, *Der Rheinländische Hausfreund*, a number of short stories afterward published as *Schatzkästlein des rheinländischen Hausfreundes* (1811). Hebel's complete works were published in eight volumes (1832-34). Consult: Schultheiss, *Hebels Leben* (Heidelberg, 1831); Längin, *Johann Peter Hebel, ein Lebensbild* (Karlsruhe, 1874); Giehne, *Studien über Hebel* (Würzburg, 1894).

HEBER, REGINALD (1783-1826). An English poet, second Bishop of Calcutta, born at

Malpas, Cheshire. In 1800 he entered Brasenose College, Oxford, and three years afterward produced his prize poem, "Palestine." In 1805 he became a fellow of All Souls. In 1807 he was inducted into the family living at Hodnet. In 1812 he was made prebendary of St. Asaph and published a volume of poems, *Poetical Works*; in 1815 he was appointed Bampton lecturer at Oxford and in 1822 preacher at Lincoln's Inn. The same year he was consecrated Bishop of Calcutta. During his three years in India he labored with great zeal, traveling through his vast diocese, healing dissensions, and encouraging his fellow missionaries. His prose writings include the Bampton lectures on *The Personality and Office of the Christian Comforter* (1816); *A Life of Jeremy Taylor* (written in 1822); *Sermons* (1829, 1830); *Journey through India* (1828). His fame, however, rests chiefly on his hymns, as "From Greenland's Icy Mountains" and "Holy, Holy, Holy! Lord God Almighty!" Consult the lives by his widow (London, 1830) and by G. Smith (ib., 1895), and A. Montefiore, *Reginald Heber* (New York, 1904).

HEBER, RICHARD (1773-1833). An English bibliophile, son of Reginald Heber and half brother of Bishop Reginald Heber, born at Westminster. He was educated by George Henry Glass and at Brasenose College, Oxford. Closely following his early devotion to Latin poetry, especially to Persius, Claudian, and Silius Italicus, whom he edited (respectively in 1790, 1793-96, 1792), came an interest in early English drama and poetry; and he became the intimate friend of Walter Scott, who frequently alludes to him in his notes, and dedicated to him the sixth canto of *Marmion*. He was chosen member for the University of Oxford in 1821 and resigned from Parliament five years afterward. He was (1824) one of the founders of the Athenæum Club. His wonderful collections of books—said to have cost him £100,000—were not mentioned in his will and were sold at auctions in London, Ghent, and Paris; they included more than 145,000 volumes and formed a matchless library of early English literature.

HEBERDEN, WILLIAM (1710-1801). An English physician, born in London. He graduated at St. John's College, Cambridge, in 1728, studied medicine in London, and practiced for 10 years in Cambridge and for more than 30 years in London, where he was prominent in the College of Physicians. A remarkably original thinker, Heberden took minute notes on his more important cases and published them under the title *Commentarii de Morborum Historia et Curatione* (1802), of which an English translation, possibly by his son William, appeared in 1803. His contributions to the *Medical Transactions* of the College of Physicians include a description of the first recorded case of angina pectoris and other original matter. Heberden's nodes, knobby enlargements of the terminal phalanges of the fingers in arthritis deformans, are called after him.

HÉBERT, A'HAR, EDMOND (1812-90). A French geologist, born at Villefargeau, Yonne, and educated at the Collège de Meaux, Auxerre, where he became professor in 1836, and at the Ecole Normale, Paris, where he was appointed instructor in 1833, returning as demonstrator in chemistry and physics in 1838, and becoming director of the department of science in 1852. In 1857 he accepted the professorship of geology at the Sorbonne. He did important work on

Tertiary, Cretaceous, and Jurassic formations and came to be known as the leading French geologist of his day. His publications include: *Les mers anciennes et leurs rivages dans le bassin de Paris* (1857); *Mémoire sur les fossils de Montreuil-Bellay* (1861); *Matériaux pour servir à la description du terrain crétacé supérieur en France* (1875); *Notions générales de géologie* (1883).

HÉBERT, ERNEST (1817-1908). A French painter, born at Grenoble. He was a pupil of David d'Angers and Paul Delaroche and won the Prix de Rome in 1839. He was director of the French Art School in Rome from 1866 to 1873 and from 1885 to 1890. Although classic and elegant in style, and a good colorist, Hébert has often a cloying sentimentality. The picture which made him famous, "Malaria"—a scene of the Pontine marshes—is typical of his art, which prefers morbid subjects. Besides this picture the Luxembourg (Paris) possesses "The Kiss of Judas" and two others; the museum of his native city nine examples, including "A Slave Breaking his Chains." He also painted portraits, of which we cite those of himself (Grenoble) and Madame d'Attainville (Luxembourg). He received all honors possible to a painter. He won first medals at the Paris Exposition of 1855, the Grand Prix at the Paris expositions of 1889 and 1900; he was chosen member of the Institute and Commander of the Legion of Honor in 1874 and received the Grand Cross in 1903.

HÉBERT, JACQUES RENÉ (1755-94). A journalist and politician of the French Revolution. He was born at Alençon, Nov. 15, 1755, of respectable parents, and was educated at the local college; but disgracing his family by his wild conduct, he quitted Alençon, went to Rouen, and subsequently arrived at Paris. There he dragged out a miserable existence from 1780 to 1790. He finally emerged from obscurity in the latter year as a pamphleteer and editor of a rabid Republican paper, *Le Journal du Soir*. He first became famous, however, as the editor of the journal *Le Père Duchesne*, started in opposition to a publication of the same name edited by Lemaire. He displayed such an exaggeration of principles and cynicism of language that he not only ruined the enterprise of his honest rival, but made himself a popular idol and earned the name of "Père Duchesne." After the events of Aug. 10, 1792, he became a member of the Revolutionary Commune, and as such approved of the September massacres. In December, 1792, he became a substitute procureur for the Commune and in 1793 actively advocated the overthrow of the Girondist party. The Convention, alarmed at the violence of the Hébertists, ordered Hébert and three others to be arrested. His popularity was so great, however, that he had to be set at liberty a few days later, and he was presented with a civic crown by the Commune. With Chaumette he inaugurated the worship of Reason, and as a member of the commission appointed to examine Marie Antoinette, he added to her sufferings by accusing her falsely of scandalous offenses. His party were called *les enragés* and advocated the most extreme measures; but the Committee of Public Safety, under the control of Robespierre and Saint-Just, caused the Hébertists to be arrested, March, 1794, and after a summary trial Hébert, together with many of his adherents, was guillotined, March 24, 1794. His wife perished on

the scaffold a month later with Gabel and Chaumette. Consult: Duval, "Hébert chez lui, dans la révolution française," *Revue Historique*, vols. xii and xiii (Paris, 1880-81); Brunet, *Le Père Duchesne d'Hébert* (ib., 1859); Tridan, *Les Hébertistes* (ib., 1864); Mater, *J. R. Hébert avant la journée du 10 Avril, 1792* (Bourges, 1888); Aulard, *Le culte de la raison et le culte de l'être suprême* (Paris, 1892).

HÉBERT, LOUIS PHILIPPE (1850-). A Canadian sculptor. He was born at Sainte-Sophie d'Halifax, Quebec, and studied at Montreal in the studio of N. Bourassa, and at Paris, where he afterward settled. In 1882 he won the prize offered by the Dominion government for the statue of Sir Georges Cartier (Ottawa); he was elected to the Royal Canadian Academy in 1883 and won the Confederation medal presented by the government in 1894. He became Knight of the Legion of Honor (1901). His principal works are the bronze statues of Maisonneuve and five others in Montreal; the Cartier, Mackenzie, Macdonald, and Queen Victoria monuments in Parliament Square, Ottawa; the Laval Monument, Quebec; and the Home Monument, Halifax.

HÉBERT CASE, THE. A case which involved a legal contest as to the federal and provincial legislative powers respectively in Canada in regard to the marriage contract. On July 14, 1908, Eugene Hébert and Marie Emma Clouatre were married at Montreal by a Protestant minister. The marriage was annulled on Nov. 12, 1909, because it contravened the *Ne Temere* decree. The case was afterward heard in the civil courts and finally became a political issue. In 1912 an attempt was made in the Dominion Parliament to legislate on the subject; but the Supreme Court of Canada decided that the proposed law was *ultra vires*; and on appeal this was finally ratified by the Judicial Committee of the Privy Council. Consult *Canadian Annual Review* (1911 and 1912). See also **MARRIAGE**.

HEBRA, hā'brā, FERDINAND, RITTER VON (1816-80). An Austrian dermatologist, born at Brünn. He was educated at the University of Vienna, in 1842 became instructor in dermatology in the medical faculty, was appointed consulting physician of the general hospital of the city in 1848, and professor of dermatology in 1849. He was the first great German dermatologist and entirely reformed the therapeutics of the science. He strongly indorsed local treatment. He wrote: *Atlas der Hautkrankheiten*, with Elsinger and Heitzmann (1856); *Lehrbuch der Hautkrankheiten*, with Kaposi (1872-76); and a third and smaller work under the former title, with Bärensprung (1867-68).—His son, **HANS VON HEBRA** (1847-1902), was a specialist in the same branch and wrote: *Kurzgefasstes Lehrbuch der Hautkrankheiten* (1884); *Die krankhaften Veränderungen der Haut mit Beziehung auf die Krankheiten des Gesamtorganismus* (1884); *Die moderne Behandlung der Hautkrankheiten* (1890-91).

HEBREW LANGUAGE AND LITERATURE. See **JEWS**; **SEMITIC LANGUAGES**.

HEBREW MELODIES. A collection of poems by Lord Byron which, with music by Braham and Nathan, was published in 1815 by Murray, who gave £500 for them. Among them are "The Destruction of Sennacherib," "Jephtha's Daughter," and "She Walks in Beauty."

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HEBREW MUSIC. Our knowledge of ancient Hebrew music is very scanty. With the exception of a few reliefs on coins, practically our sole source is the Bible, which must be supplemented by constant reference to the musical instruments of the Assyrians and Egyptians.

There is no reason to doubt that the Hebrew tribes, even during the nomadic period, had some music and, like the ancient Arabs, had their battle songs, their songs of triumph, their songs celebrating the exploits of their favorite heroes, which they chanted or sang to the accompaniment of primitive forms of drums and of simple stringed instruments, while for the purpose of calling the people together for battle or assembly some form of wind instrument perhaps existed in very early days. While the statement in Gen. iv. 21, that the antediluvian patriarch Jubal became "the father of all who handle the harp and the flute," manifestly has no historical value, and the description of Miriam dancing and singing to the accompaniment of the timbrel (Ex. xv. 20, 21) is probably a later embellishment of the tradition of the Exodus (q.v.), an incidental reference to "songs, drum, and lyre" in connection with friendly leave-taking, such as is found in Gen. xxxi. 27, seems to point to a popular custom associated with a comparatively primitive form of life. Through foreign influence—notably from Egypt and Babylonia—more elaborate musical instruments are likely to have been introduced into Palestine long before the Hebrew invasion, and a large variety of percussion, wind, and string instruments may have been adopted by the invading tribes from the Amorites and the Canaanites. That the earliest use of music among the Hebrews was largely if not exclusively secular seems reasonably certain; but the religious bearings of events of a secular character, such as battles and victories, rejoicings at harvest time and wedding festivities, lend to music even when thus employed also a certain religious significance. On all the occasions named, with the exception perhaps of wedding festivities, the tribal or national deity would come in for a share at least of recognition. His help was sought before proceeding to battle; to him thanks were offered for the victory, and it was his favor that had blessed the fields with plenty. From such considerations it did not require many steps for the introduction of music as part of the organized worship. To what extent, however, music was introduced in the preëxilic temple at Jerusalem it is difficult to say. Amos vi. 5 (they collect [*hasharu*, not *hashabu*] for themselves musical instruments) shows that David had in the eighth century the reputation of being interested in musical instruments. The connection rather suggests that it was for secular purposes; but it is intrinsically probable that music formed a part of the cult in Jerusalem as well as in other sanctuaries from the earliest times, though the elaborate description furnished in 1 Chron. xv. 11-24; 2 Chron. v. 12, etc., of the temple service and organization in the days of David and Solomon applies to the second temple (and even here only in a measure), and not to the first. Similarly the melodies and musical directions connected with the Psalms belong to the later phases of postexilic worship among the Jews, though all this does not preclude the possibility that in preëxilic days music on occasions formed part of the temple service in Jerusalem and perhaps also in

connection with some of the sanctuaries outside Jerusalem.

Only a few of the musical instruments mentioned in the Old Testament are genuinely Hebraic in character. 1. Of stringed instruments the most common and probably the oldest was the lyre (Hebrew *kinnor*), the form of whose sounding board, as also the number of its strings, varied considerably. Three to six strings appear to have been the ordinary number, but there are lyres depicted on Jewish coins with as many as 12 strings. Next to the lyre, the harp (Hebrew *nebel*) is most frequently referred to; but we must not suppose that the ordinary harp was a large affair, such as the Egyptians used. It was probably a small triangular instrument, consisting ordinarily of not more than 10 strings. 2. The most common wind instrument among the Hebrews was the flute (Hebrew *khalil* and *'ugab*), which, like the lyre, dates from very early times. It was the ordinary instrument at weddings and funerals and in the second temple was played before the altar on festival occasions. It is probable that the Hebrews, like the Egyptians and the Assyrians, had both the long flute, held straight before the player, and the oblique flute, which was played by blowing into a hole at the side. The horn (Hebrew *shophar*) was a ram's horn, whose limited compass (never over an octave) made it unsuitable for other purposes than signals to assemble the people, to give the order to disperse, etc. In the Jewish ritual it was retained as a solemn rite, and to this day in orthodox synagogues the ram's horn is blown during the services on New Year's Day, at the close of the Day of Atonement, on the day of the Feast of Tabernacles, and during the entire month of Elul, after the recital of the supplications. The Hebrew trumpet (*khasoserah*), of which there is a representation on the Arch of Titus, was a very long instrument and was used by the priests in the later temple service. 3. The chief percussion instruments were (a) the drum (*toph*), of which there were numerous forms, though ordinarily the hand drum is intended; (b) the cymbals (*mesilatayim*), which were made of metal; and (c) the sistrum (*mena'ane'im*), which appears to have been introduced from Egypt. Besides the above list, there are quite a number of instruments mentioned in the Old Testament (cf. especially Dan. iii. 5-10), which have not yet been identified with certainty. For example, the *symphony* (Dan. iii. 5, margin) seems to be the Gk. *συμφωνία*, *symphonia*, a species of bagpipe, the *sebbekha*, Gk. *σαμβύκη*, *sambdyke*, a sackbut, the psaltery, *pesantherin*, Gk. *ψαλτήριον*, *psalterion*, a kind of harp, while the *shalishim* (1 Sam. xviii. 6) appears to have been a sort of triangle.

Bibliography. Breslaur, *Sind originale Synagogen- und Volks-Melodien bei den Juden geschichtlich nachweisbar?* (Leipzig, 1898); Saalschütz, *Geschichte und Würdigung der Musik bei den Hebräern* (Berlin, 1829), which gives a comparison of the Hebrew instruments with the Greek and the modern Arabian; Stainer, *The Music of the Bible* (London, 1879); Wellhausen's edition of the Psalms in the *Polychrome Bible* (New York, 1898), with appendix on the "Music of the Hebrews"; J. Weiss, *Die musikalischen Instrumente in den heiligen Schriften des Alten Testaments* (Vienna, 1895); Büchler, "Zur Geschichte der Tempelmusik und

der Tempelsalmen," *Zeitschrift für alttestamentliche Wissenschaft* (1899-1900); Gressmann, *Musik und Musikinstrumente im Alten Testament* (Berlin, 1903); Prince, art. "Music," in *Encyclopædia Biblica* (New York, 1903); Cohen, "Music," in *The Jewish Encyclopædia* (ib., 1905); Benzing, *Hebräische Archäologie* (2d ed., Tübingen, 1907); Cornill, *Music in the Old Testament* (Chicago, 1909); Gunkel, "Poesie und Musik Israels," in *Die Religion in Geschichte und Gegenwart* (Tübingen, 1913). See PSALMS; DAVID.

HEBREWS. The name given to a group of tribes of Semitic stock. It is first applied in the Bible to Abraham (Gen. xiv. 13); but there is an earlier eponymous ancestor, Eber (Gen. x. 21), to whom it properly belongs. When Abraham is designated as "the Hebrew," it would therefore seem to be implied that he belonged to a people existing long before his time, including various South Arabian as well as Mesopotamian clans. It is now generally assumed by scholars that the Hebrews are referred to as Habiri in the Tell el-Amarna letters (c. 1400 B.C.). This is in harmony with biblical tradition. There is no intimation in the Amarna correspondence as to their origin or ethnic character. In Gen. xl. 15 Joseph explains to the Egyptians that he had been robbed from the land of the Hebrews; in Ex. ii. 6 the Egyptian princess recognizes in Moses one of the Hebrews' children; and in 1 Sam. iv. 6 the Philistines speak of the great shout in the camp of the Hebrews. The implication is that the Israelites were known to foreigners as Hebrews. From the genealogies it may be inferred that they regarded themselves as a part of the Hebrews, who included not only the supposed descendants of Abraham, such as Israel, Judah, Ishmael, Edom, Sheba, Dedan, Midian, etc., but also Moab, Ammon, and many tribes in Mesopotamia and Yemen. How far this may be correct still escapes historic verification; but there is no reason to doubt that the Habiri-Hebrews, when they appeared in Palestine in the fifteenth century B.C., may have contained elements coming on the one hand from south Arabia, on the other from Mesopotamia. Etymologically Hebrews may mean "those who pass from place to place," "nomads," and may have been a designation given them by the Amorites. Neither Israel nor Judah seems to have called itself by this name in the days of their independence. In later times the name has been applied to the Jews, not only by foreigners, but also by themselves. See JEWS; PALESTINE; SEMITES; SEMITIC LANGUAGES.

HEBREWS, EPISTLE TO THE (Gk. *ἡ πρὸς Ἑβραίους ἐπιστολή*). One of the books of the New Testament canon, usually classed as an epistle. The work, as a whole, may be viewed as a hortatory argument intended to show that in Christ, His Son, God has given His final and perfect revelation, and thus the new Christian faith completely fulfills and supersedes the purely typical and incomplete and temporary provisions and ceremonies of the old (Mosaic) covenant. In particular the argument seeks to show that Jesus is the one only true and perfect High Priest, whose priesthood is eternal and continuously efficacious. Such being the case, the readers are urged to abide steadfast in the faith, to endure all trials with patience, knowing that soon their reward will be complete. The critical questions concern the author, the readers

to whom the work was addressed, and the place where, as well as the time when, it was written, and it cannot be said that any one of them is yet positively settled.

The time of composition could not have been later than 95 A.D., since the book was used freely by Clement of Rome in his letter to the Corinthians, which is assigned to about this date. How much earlier than this it was written depends largely upon what is to be understood by the persecutions referred to in x. 32-34. If they are to be identified with the Claudian edict (see PERSECUTIONS OF THE CHRISTIANS), it cannot be dated earlier than 48; if they are to be identified with the Jewish War (see JEWS), it cannot be dated before 65. In fact, whichever event is intended, it is likely that the writing was long subsequent to it, since the persecutions are referred to as belonging to the "former days" (x. 32). As between these two events, however, the statement in xii. 4 that the readers had "not yet resisted unto blood" would seem to make it unlikely that they had passed through the horrors of the Jewish War. But the force of this argument is dependent largely on the assumption that the readers were resident in Jerusalem or some part of Palestine. If resident elsewhere, then a new viewpoint of the persecutions is possible, and the above limits may not be necessary. It would seem to be certain that the author belonged to a generation later than the Gospel times (ii. 3; cf. Luke i. 1-4), and that the readers were under rulers different from those who had founded and had originally been in charge of the Church (xiii. 7). It would further seem to be clear that the persecutions mentioned in x. 32-34 as belonging to the "former days" are to be separated from those in the midst of which the readers were at the time of writing, and in which they had not yet come to the shedding of blood (xii. 4), though the crisis of their troubles was not far beyond them (x. 25; cf. xii. 25-29). Anything more definite than this, however, must depend upon the consideration of the remaining points.

The place of the Epistle's composition would seem largely to depend on the interpretation of xiii. 24 b. If "they of Italy" is to be understood as referring to those who had come from Italy, then the Epistle was written somewhere outside of that country; if it is to be understood as referring to those who belonged to Italy, then the place of writing was most naturally somewhere within that land. As to which of these two usages the author had in mind, it may, perhaps, be impossible definitely to say; although, from the grouped character of the salutations in the verse, it would seem that he was sending a greeting to all those who were associated with the readers—both officers and fellow Christians—from all those who were associated with himself. But this would seem to imply that these latter were the Christians generally of the land from which he was writing, since otherwise they must be merely Christian sojourners who were accidentally in the place where he was. In this case, we should have a general greeting on the one side and a strangely partial greeting on the other—a greeting from a group of Christian travelers in a city, but none from the Christians of the city itself. There would, consequently, seem to be something in favor of the Epistle's having been written within the land of Italy. If so, it was probably at

some other place than Rome, since Timothy's release from prison and his expected arrival at the place where the author was (xiii. 23) would indicate a coming from Rome, as the most probable place of imprisonment, to some other place where the author was awaiting him.

The readers of the Epistle have generally been considered Jewish Christians—a conclusion which would appear to be clearly evidenced by the distinctively Hebrew character of the argument employed in the Epistle. Recently, however, critics have claimed a Gentile Christian readership, saying that a Hebrew argument might have been formulated for Christians who were not Jews. Theoretically this is true; but were it so in this particular case, the Epistle would become a purely academic essay, lacking all the significance which would otherwise come from its appeal to the Jewish race from the point of view of its peculiar institutions and its distinctive Scriptures. It amounts to nothing in support of such Gentile readership to contend that the Epistle contains no direct statement of the fact that the readers were in danger of an apostasy to Judaism, for the readers might not have come to the point of apostatizing and yet have been Jews. Jewish Christians as well as Gentile might have been simply weak in the faith and in need of exhortation to hold fast to their profession. In fact, if this weakness of faith and insecurity of profession were the condition of the readers, it is difficult to understand why such a Jewish background to the strengthening exhortation given them was selected, unless they were Jewish themselves. In view of this background, such passages as vi. 1, 2, and xiii. 4 are of no significance, since they are both specifically applicable to Jewish Christians, the latter especially, in view of Paul's arraignment of the race in Rom. ii. 17-29.

Admitting the probability, therefore, that the readers were Jewish, their habitation would seem to be most naturally in a place of Jewish surroundings such as Palestine and Jerusalem. Against this, however, is the strong Alexandrian mode of thought which quite plainly underlies the Epistle's argument. This would not be natural in the places mentioned above. On the contrary, it would suggest Alexandria itself and Egypt. Against this latter location the only argument would be our general ignorance of the condition of early Christianity in this region. Rome is urged by modern critics, and, as far as the Alexandrian mode of thought is concerned, there might not be much against the place. As a matter of fact, however, the critics base their contention largely on the specifically Jewish character of the Roman church—an argument which is so clearly against the facts of the Roman Epistle as to be impossible of acceptance. There would, consequently, seem to remain only some such locality as the Phrygian region of western Asia—a region largely inhabited by Jews and largely under the influence of Alexandrian thought. With such a locality Timothy's relationship (xiii. 23, "our brother Timothy"), and the evident tendencies of the readers to angel worship (chaps. i and ii), an eclectic spirit, and a false asceticism (chap. xiii), would be significant.

In view, therefore, of the probable Jewish character of the readers and their most natural location in western Asia Minor, the strong probability of an Italian place of composition is greatly strengthened; since to Jewish readers

resident in Phrygia a salutation from mere Italian sojourners would have no meaning. And in view of all three points, a date some time after the Jewish War would seem most reasonable; for then the Jewish colonies in the Diaspora would be largely increased and such independent Hebrew congregations more possible. We could also thus understand by the persecutions of the "former days" the Jewish War, whose horrors were not likely to have faded from the exiles' minds; while the newer persecutions, in the beginnings of which the readers were (xii. 4), could quite easily be the rise of the Domitian anti-Christian aggressiveness. This supposition is favored by two considerations—the distinctive Jewish rivalry to Christianity after the destruction of Jerusalem, and the general Christian disappointment at the nonreturn of Christ, which had been widely expected in connection with this catastrophe, in view of the common understanding of the words of Christ as promising it. These two facts would almost seem to account for the troublous situation of the readers, at least from its Jewish side; for it is clear they were suffering from oppression by their unbelieving countrymen—an oppression which gathered an irritating strength largely from the failure of the expected return of their Christ. This oppression might be more or less connected with the government's hostility and shows the situation to have been one of peculiar danger because of the combination of evil which threatened them. We might place the writing of the Epistle, therefore, somewhere about 90 A.D.

The question of author has been generally held to be the most important point connected with the criticism of the Epistle. It is, in fact, the least important, since the even approximate settling of the above questions gives us practically all the critical knowledge of the Epistle which we need for working purposes. The fact, therefore, that there is no certain answer to this question is of no significance. At the same time it can be safely said that, whoever the author may have been, he was not Paul. This is universally accepted by critics to-day. Outside of Paul, evidence would seem in some respects to point to Barnabas, whose name was apparently attached to the manuscripts of the Epistle with which Tertullian was acquainted, and whose authorship was considered by him in his day as an accepted tradition. Any definite conclusion, however, is impossible. The attempt of Harnack to credit it to Prisca and Aquila, chiefly Prisca, is not supported by the facts.

Doctrinally Hebrews holds in one respect a unique position, for its conception of the Messiah as a *priest* is not found in any other part of the New Testament, and there is no evidence that such a doctrine was definitely taught by Jesus. The writer was profoundly convinced of the typological significance of the sacrificial ritual of the Old Testament, viewing it as having as it were a prophetic aspect and destined to be at some time ideally fulfilled. Making use of the common view of Jesus' death as having an atoning significance, and of the common faith in Him as the glorified Son of God, he formulated his theory of the eternal high-priesthood of Jesus and thus in his way proved what Paul proved in another way (e.g., in Galatians, q.v.), viz., the all-sufficiency of God's work in Christ and the fact of direct and immediate access to God through faith in Christ.

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HEBREWS, GOSPEL OF. See APOCRYPHA, *New Testament*.

HEBRIDES, hēb'ri-dēz. The name applied to all the islands of the west coast of Scotland, popularly known as the WESTERN ISLES (Map: Scotland, A 2). They are classified as the Outer and Inner Hebrides. To the Outer belong Lewis-with-Harris, North Uist, Benbecula, South Uist, Barra, and the remote Isle of St. Kilda. The principal of the Inner islands are Skye, Coll, Tiree, Eigg, Mull, Iona, Staffa, Ulva, Lismore, Kerrera, Easdale, Colonsay, Jura, and Islay. Bute, Arran, and the Cumbraes, though lying in the Firth of Clyde, are usually classed with the Hebrides.

The total number of the Hebrides is about 521; of these not more than 120 are inhabited, and one-third of this number have a population of not more than 10 persons each. The entire area is 2812 square miles, and the population in 1901 was 78,947, of which 41,031 were females, who outnumbered the males by 10 per cent. Only about 200,000 acres are arable; the rest is in pasture land, and in morasses, peat mosses, lakes, and barren sands and rock. Geologically the Hebrides are divided into groups, of which the more important are the gneiss, trap, and slate. The scenery is grand and picturesque; Mull is noted for its lofty mountains, Jura for its peaks, and Arran for its high, rugged hills. Islay and Bute are comparatively level and arable. Staffa is remarkable for its basaltic columns and great cavern. Iona derives interest from its ruins and historical associations. Politically all the Hebridean isles are attached to Scotland. The counties among which they are distributed are those of Ross, Inverness, Argyll, and Bute. The principal Hebridean towns are Stornoway in Lewis, Portree in Skye, Tobermory in Mull, and Rothesay in Bute. Though situated on the mainland of Argyll, Oban (q.v.) is usually considered a town of the Hebrides and, along with Rothesay, is best known to tourists. Sheep, cattle, and pony rearing, herring fisheries, distilling, slate quarrying, and the manufacture of kelp are the chief industries. Live stock, fish, kelp, wool, and stone are the principal exports; iron and groceries the imports.

Enjoying the benefit of the moist southwest winds, the climate, although humid, is mild, pleasant, and healthful, and is recommended for certain classes of invalids. The poorer class of natives for the most part speak Gaelic. The establishment of several distinct lines of steamer communication with Glasgow and the opening up of remote tracts formerly reached with difficulty have developed the resources of the islands and brought them, with the neighboring coast, within the sphere of trade and the reach of tourists, who come in large numbers and add materially to the prosperity of the inhabitants of the islands. Under modern proprietorship

real estate has improved, and large tracts of moorland are annually rented to sportsmen as shooting grounds.

The Hebrides are the *Ebudæ* of Ptolemy, the *Hebudes* of Pliny, and the *Sudreyjar* of the Norwegians. In the latter part of the ninth century emigrants from Norway subdued the Celtic inhabitants. These settlers very soon became sufficiently powerful to annoy the mother country, whereupon Harald Haarfagr (q.v.) fitted out a large expedition and subdued not only the Hebrides, but also the Orkneys, the Shetlands, and Man. These became a Norwegian kingdom, with its chief seat at Colonsay. They remained subject to Norway till 1266, three years after the battle of Largs, and were then transferred to Scotland. In 1346 one of the chiefs, named Macdonald, reduced the whole under his authority and took the title of "Lord of the Isles" (q.v.). The Hebrides were ecclesiastically dependent on Norway as late as 1374. The islands remained turbulent and backward in civilization until after 1748, when the heritable jurisdiction of the chiefs was abolished and the authority of the central government established. The abolition of feudal conditions, however, did not bring prosperity. The tenant farmers were driven out by high rents, and sheep farming was introduced on a large scale. The rapidly increasing population was forced to depend almost entirely on herring and potatoes for subsistence. In 1846 a potato blight left the greater part of the population destitute. In 1884 a royal commission was appointed, whose recommendations led to the passage, in 1886, of the Crofters' Holdings Act, which has done much to improve the economic condition of the islands. Scott's *Lord of the Isles* contributed materially to create popular interest in these islands, which has been added to by William Black's novels. Consult: Buchanan, *Hebrid Isles* (London, 1883); Gordon-Cumming, *In the Hebrides* (ib., 1883); Mackenzie, *History of the Outer Hebrides* (Paisley, 1903); J. Boswell, *Journal of a Tour to the Hebrides* (new ed., London, 1906); L. C. Hartley, *Wind-Seekers in the Hebridean Seas* (Manchester, 1906).

HEBRON (Heb. *Khebrôn*). A very ancient sacred city of southern Palestine, the modern El-Khalil, about 21 miles south-southwest of Jerusalem (Map: Palestine, C 4). It figures in tradition as one of the oldest cities of Palestine (cf. Num. xiii. 22) and was originally called Kirjath Arba, 'four-city' (Gen. xxiii. 2; Josh. xiv. 15; cf. Josephus, *Bel. Jud.*, iv, 9, 7). As one of the famous sanctuaries of the south, it became associated in the traditions and legends of the Hebrews with the beginnings of their history. All three patriarchs—Abraham, Isaac, and Jacob—are represented as sojourning in Hebron (Gen. xiii. 18; xxxv. 27; xxxvii. 14), and tradition locates here the cave of Machpelah, where all three, as well as Sarah and Rebecca, were buried (Gen. xxiii; xxv. 9; xxxv. 27–29; xlix. 29–32; l. 13). The spies sent out by Moses before entering the promised land came hither (Num. xiii. 21, 22). Joshua is said to have destroyed the city, given it to Caleb for an inheritance, and made it a city of refuge (Josh. x. 36–37; xiv. 13; xx. 7). Hebron figures prominently in the history of David (q.v.); it was here that he was anointed King, first over Judah, later over all Israel (2 Sam. ii. 1–4; v. 1–3). The popularity of the Davidic dynasty probably had much to do with the production of legends re-

garding Hebron and the reshaping of old traditions of the place to make them conform to the later scheme of Hebrew historiography. It was from Hebron that Absalom made his attempt to secure the throne (2 Sam. xv. 7 et seq.). After this time it is seldom mentioned in biblical history. Judas Maccabæus captured it from the Edomites, and the Romans stormed it. It was held for a time by the Crusaders and became the seat of a Latin bishop in 1167, but fell into the hands of Saladin (1187), and since then has belonged to the Mohammedans, who have always respected its sanctity and regard it as one of the four sacred cities of the world, Mecca, Medina, and Jerusalem being the other three. Its association with Abraham, who is called by the Mohammedans *Khalil Allah* (friend of God), has given it its modern name. The city has at present a population of about 22,000, including 2000 Jews. The chief object of interest in the city is the Haram, or sacred area inclosing the traditional site of the cave of Machpelah, a mosque, and dwellings of dervishes, saints, and guardians. The mosque is a building erected by the Crusaders between 1167 and 1187, probably on the site of a church built by Justinian. Only a few Europeans of high rank have been admitted to the Haram. We possess no account of the cave of Machpelah; above this cave there are said to be six shrines, or cenotaphs, of the patriarchs. Jews and Christians are not allowed to ascend beyond the seventh step of the flight on the southern side. The Jews lament here, as they do at the Place of Weeping in Jerusalem. An ancient oak in the garden of the Russian hospice is pointed out as the oak of Abraham. In the neighborhood are the so-called tombs of Ruth, Jesse, and Abner. North of the city are the ruins of Haram Ramet el-Khalil, an ancient structure, of which the south and west walls have in part been preserved; the blocks are of great length (10 to 16 feet) and are jointed without mortar. Consult: Robinson, *Biblical Researches* (2d ed., London, 1856); Guérin, *Judée*, vol. iii (Paris, 1869); Benzinger, in Baedeker, *Palestine and Syria* (5th ed., Leipzig, 1912).

HEBRON. A city and the county seat of Thayer Co., Neb., 81 miles southwest of Lincoln, on the Little Blue River, and on the Chicago, Burlington, and Quincy and the Chicago, Rock Island, and Pacific railroads (Map: Nebraska, G 4). It is the commercial centre for a farming and stock-raising district, has flour mills and a cement-block factory, and contains the Blue Valley Hospital, Lutheran Academy, Sacred Heart parish, and Sisters' Home (Catholic). The water works, electric-light plant, and sewage system are owned by the city. Pop., 1900, 1511; 1910, 1778.

HEBRUS, hēbrūs. The ancient name of the river Maritza (q.v.).

HECATÆUS OF ABDERA (or, according to some, of Teos). A Greek historian and philosopher, of the fourth century B.C. He went with Ptolemy I Soter on an expedition to Syria, and also up the Nile as far as Thebes. Out of his travels sprang two works, *Αἰγυπτιακά*, *Aigyptiaca*, dealing with Egypt, and *Περὶ Τρεπορέων*, *Peri Hyperboreōn*, on the far north. Suidas declares that he wrote also on the poetry of Hesiod and Homer. The work on Egypt was used by Diodorus Siculus. For the fragments of Hecataeus' writings, consult Müller, *Frag-*

menta Historicorum Græcorum, vol. ii (Paris, 1841), and Reinhardt, "Hecateus von Abdera und Demokritus," in *Hermes*, xlv (Berlin, 1912).

HECATEUS OF MILETUS (Lat., from Gk. 'Εκαταίος, *Hekataios*). The most important of the Greek logographers (q.v.), son of Hege-sander of Miletus. He flourished about 500 B.C. At the time of the Ionian revolt (c.501-493 B.C.) he strove in vain to keep his countrymen from entering upon the war with Persia, and after their defeat he went as an ambassador to Artaphernes, the Persian satrap, and induced him to treat the Ionians kindly. Like most of the logographers, he was an extensive traveler; to judge from the fragments of his work, he must have visited Greece, Thrace, the countries bordering on the Euxine, a great part of Persia, Africa, and possibly Italy and Spain. He wrote a work called *Genealogies* (Γενεαλογίαι), which was little more than a prose version of the poetical legends of the Greeks. A work called *Tour of the World* (Περίπλος Τῆς), in two books, commonly ascribed to him, is interesting from the fact that it was accompanied by a map of the earth, probably based upon that of Anaximander (q.v.); the authenticity of this work, however, is questioned by Wells, *Journal of Hellenic Studies*, vol. xxix (London, 1909). To this *Tour* Herodotus was much indebted. The fragments of these two works are published by Müller, *Fragmenta Historicorum Græcorum*, i and iv (Paris, 1841-70). Consult also: Atenstädt, "De Hecatei Milesii Fragmentis quæ ad Hispaniam et Galliam Pertinent," *Leipziger Studien zur classischen Philologie*, vol. xiv (Leipzig, 1891); Tropea, *Ecateo da Mileto ed i frammenti della periegesis (estratto degli Atti dell' Acad. Peloritana, 1896-97)*; Berger, *Geschichte der wissenschaftlichen Erdkunde der Griechen* (2d ed., Leipzig, 1903); Prasek, "Hekataios als Herodots Quelle zur Geschichte Vorderasiens," in *Klio*, vol. iv (ib., 1904); Bury, *The Ancient Greek Historians* (New York, 1909).

HECATE, hēk'ā-tē (Lat., from Gk. 'Εκάτη, *Hekātē*; the name perhaps means 'the far-working goddess,' from *ekās*, *hekas*, afar). An ancient Greek deity, generally regarded, not only from her functions, but from the direct statements of the ancients, as a moon goddess. She is first mentioned by Hesiod, in *Theogony*, 409 ff., as the only daughter of the Titan Perses and of Asteria, or night; some, however, consider this passage a later interpolation. Hesiod praises her as a mighty goddess ruling earth, heaven, and sea, the helper of hunters and fishermen, giver of victory in battle and council. Like other moon goddesses, she appears as helper of women in their confinement, guardian of children, and goddess of marriage; she also possesses the power of purifying from sin, as did Apollo. Mysteries were celebrated in her honor at Ægina and in conjunction with the Corybantes in the Zerynthian cave of Samothrace. The special seats of her worship are found in Asia Minor and on the east coast of Greece, though in later times she was widely honored. Hecate in the general belief of antiquity was associated with the guardianship of doors and roads, and her sanctuaries seem in general to have been little more than wayside shrines. A statue of the triple Hecate by Alcamenes stood near the entrance to the Acropolis of Athens, and she was worshiped in

private houses. The crossroads were under her special protection, and at them sacrifices, especially of dogs, were offered. At each new moon, also, the rich set out in her honor food, which was eaten by the poor. As a goddess of the night, Hecate is also associated with the lower world, a companion of Persephone, and guardian of her door. She had control of the spirits of the dead, goblins, and spectres; her coming was greeted by the howling of dogs, and she was invoked by magicians and witches. From these varied functions it is not strange that she became closely connected with Persephone and especially with Artemis. In art she was at first represented as a maiden carrying torches; this type persisted through the classical period. The common type, however, derived probably from her epithet Τριπίτῆς (Lat. *Trivia*, 'where three roads meet'), was that of three bodies, joined so as to face in three directions. In this three-bodied guise she represents, it has been held, the new, the full, and the waning moon. In the frieze of the great altar at Pergamon (q.v.), Hecate is shown as having three heads and six arms, but a single body, and this type appears occasionally in later works. Consult: Preller-Robert, *Griechische Mythologie* (Berlin, 1894); Gruppe, *Griechische Mythologie*, vol. ii (Munich, 1906); and especially the article "Hekate" in Roscher, *Lexikon der griechischen und römischen Mythologie* (Leipzig, 1886-90), and in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. vii (Stuttgart, 1912). For a different view, which makes Hecate originally an earth goddess, see Farnell, *Outlets of the Greek States*, vol. ii (Oxford, 1896).

HEC'ATOMB (Lat. *hecatombe*, from Gk. ἑκατόμνη, *hekatombē*, from *ekátō*, *hekatōn*, hundred + *boús*, *bous*, ox). Strictly, a sacrifice of 100 oxen, but even in the Homeric poems a term for any sacrifice of a large number of animals; thus, we hear of a hecatomb of 12 oxen or of 50 rams. The belief that the favor of the gods was dependent upon the size of the offering probably was one factor in inducing such large numbers of victims; but a powerful influence was also exerted by the desire to feed the populace, since only a small part of each victim was actually consumed upon the altar. See also SACRIFICE.

HECK, BARBARA (1734-1804). One of the founders of the Methodist church in America. She was born, of German parentage, in Ballygarry, County Limerick, Ireland, a district which early felt the influence of Wesley's preaching. She and her husband, Paul, came to America in 1760 and in 1766, with Philip Dunbury, organized a Methodist society in New York City. The building of the famous old John Street Methodist Church was due, in great part, to her tireless energy. During the Revolution the Hecks retired to northern New York and finally to Canada, to be among Loyalists. They founded the earliest Methodist society in Canada. Consult W. H. Withrow, *Barbara Heck: A Tale of Early Methodism* (Cincinnati, 1895).

HECK'ELPHONE. A member of the family of oboes (q.v.), named after its inventor, W. Heckel. Its range is from A to f, and the sound has a rich, mellow barytone quality. It was introduced into the orchestra by R. Strauss in his *Salome* (1905).

HECKER, FRIEDRICH KARL FRANZ (1811-

81). A German revolutionist and American soldier. He was born at Eichersheim in Baden, Sept. 28, 1811, and after studying law in Heidelberg became, in 1838, advocate of the Supreme Court in Mannheim. Elected in 1842 a member of the Second Chamber in Baden, he abandoned his profession for political life and soon grew popular among the more advanced elements of the opposition. He sat and voted with the Extreme Left, and his influence helped to oust the Blittersdorf ministry from office. In 1845, in conjunction with Itzstein, he conducted a democratic campaign in Germany, during which he was arrested at Berlin and expelled from Prussia. In 1848 he employed his eloquence in revolutionary agitation, and he and Struve became leaders of the advanced Revolutionary party. When the preliminary convention of the German nation (*Das Vorparlament*) met at Frankfurt, Hecker endeavored, with the influence of his whole party, to constitute it into a permanent republican assembly. The frustration of this effort led him to attempt to surprise the smaller governments of southern Germany with the bands of artisans which had come from France. Defeated at Kandern, in Baden, April 20, 1848, he fled into the Canton of Basel, where he conducted a radical newspaper and wrote his work, *Die Völkserhebung in Baden*. On being refused admission to the National Assembly at Frankfurt, though twice elected to represent Thingen, he emigrated to America, where he bought a farm at Bellville, Ill. The Baden revolution (1849) brought him back to Europe; but finding the revolution over on his arrival, he returned to America. He was a colonel and brigadier general in the Union Army during the Civil War, raising a regiment and acquitting himself with distinction. During his later years Hecker watched with interest the founding of the new German Empire and was a staunch supporter of German interests in America. He died at St. Louis, March 24, 1881. His *Reden und Vorlesungen* were published in Germany in 1872 and were followed two years later by *Betrachtungen über den Kirchenstreit in Deutschland und die Infallibilität*.

HECKER, ISAAC THOMAS (1819-88). An American priest of the Roman Catholic church, founder of the Paulist Fathers. He was born in New York City and early in life engaged in business. In 1843 he was a member of the socialistic community at Brook Farm and later of that at Fruitlands, Mass. He also lived for some time with Henry D. Thoreau at the latter's "Hermitage." In 1844 he was converted to the Roman Catholic faith and five years later was ordained to the priesthood by Cardinal Wiseman. He joined the Redemptorists, but with others was released from his vows to found in 1858 the Congregation of St. Paul the Apostle, or Paulists (q.v.), in New York. Father Hecker was the founder and director of the Catholic Publication Society and also founded and edited from 1865 until his death the *Catholic World*, a popular Roman Catholic magazine in America. His writings also included: *Questions of the Soul* (1855); *Aspirations of Nature* (1857); *Catholicity in the United States* (1879). Consult Elliott, *Life of Father Hecker* (New York, 1891). The appearance of an abridged and incorrect anonymous French version (1897; 6th ed., 1898) of Father Elliott's volume evoked an attack by Abbé Maignan, of the Congregation of St. Vincent de Paul, in *Le Père Hecker, est-il*

un saint? (1898). This was succeeded by the so-called "Americanism" controversy, for the settlement of which Pope Leo XIII in 1899 addressed an apostolical letter, the *Testem Benevolentie*, to Cardinal Gibbons. The charge had been made that the American Paulists had allowed too great departures from Catholic doctrine and discipline, but the charge was not sustained. For an account of the matter, consult Sedgwick, *Father Hecker* (Boston, 1900).

HECKER, JOHANN JULIUS (1707-68). A German educator, born at Werden, Prussia. He studied at Halle, where he specialized in pedagogy. He had charge of the school systems in Potsdam and Berlin for a number of years. Hecker was the founder of a new type of school when in 1747 he opened the Oekonomisch-mathematische Realschule, probably the earliest of the Realschule of Germany to provide a non-classical curriculum. He also interested himself in the training of teachers. At the command of Frederick II of Prussia he drew up a system of regulations for the government of common schools, parts of which are still in force. Consult Fr. Ranke, *Johann Julius Hecker* (Berlin, 1861).

HECKER, JUSTUS FRIEDRICH KARL (1795-1850). A German physician and writer of medical history, born in Erfurt, Prussian Saxony. He was professor of medicine in the University of Berlin and wrote: *Geschichte der Heilkunde* (2 vols., 1822-29); *Der schwarze Tod im 14. Jahrhundert* (1832); *Die Tanzwut, eine Volkskrankheit im Mittelalter* (1832), translated into English by B. G. Babington, under the title "The Dancing Mania of the Middle Ages" (1875); *Der englische Schweiss: Ein ärztlicher Beitrag zur Geschichte des 15. und 16. Jahrhunderts* (1834); *De Peste Antoniniana Commentatio* (1835); *Geschichte der neuern Heilkunde* (1839); *Kinderfahrten, eine historisch-pathologische Skizze* (1845).

HECKEWEILDER, JOHN GOTTLIEB ERNESTUS (1743-1823). An American pioneer missionary and orator, born in Bedford, England. He came to Pennsylvania with his parents in 1754, studied theology, and entered the Moravian ministry. In 1771 he became assistant to David Zeisberger (q.v.), who had charge of the missionary work of that church among the Indians in the Ohio country, whither Heckewelder proceeded in that same year. In this service he remained for 15 years. In 1792 and 1793 he assisted in drawing up treaties between the United States and the Indians, by whom he was greatly loved and trusted. He remained in Ohio until 1810, when he settled at Bethlehem, Pa., and engaged in writing the history of his labors and observations. He published: *An Account of the History, Manners, and Customs of the Indian Nations who Once Inhabited Pennsylvania and the Neighboring States* (1818), which was translated into both German and French; *Narrative of the Mission of the United Brethren among the Delaware and Mohegan Indians* (1820); *Names which the Leni Lenape or Delaware Indians Give to Rivers, Streams, and Localities* (1822; new ed., 1907). Many of his manuscripts are preserved in the Pennsylvania Historical Society. His narratives are valuable, though uncritical. Consult Rondthaler, *Life of Heckewelder* (Philadelphia, 1847).

HECKLE. See HACKLE.

HECKMONDWIKE, hek'mond-wik. A manufacturing town in the West Riding of York-

shire, England, 10 miles southwest of Leeds. It has coal mines, ironworks, machine shops, dye works, and is an important centre of carpet, blanket, and heavy woolen manufactures. The town has good drainage, an ample water supply, and electric lighting. Pop., 1901, 9460; 1911, 9016.

HECKSCHER, hĕk'shĕr, JOHANN GUSTAV WILHELM MORITZ (1797-1865). A German politician, born in Hamburg. He served during the War of 1815 as a volunteer in the Hanseatic Corps and then studied at the universities of Göttingen and Heidelberg. Upon completing his studies, he first traveled all over the Continent and then settled in Hamburg, where he practiced law, and after 1840 directed the politics of the *Hamburger Nachrichten*. In 1848 he was elected to the Vorparlament, in which he opposed the propositions of the Democratic party. In the National Assembly at Frankfurt (1848-49) he was at first a member of the Left Centre, but inclined more and more to identify himself with the Right. He advocated the election of Archduke John of Austria as vicar of the provisional government, in which he himself was appointed Minister of Justice, and opposed the proposition to exclude Austria, and erect a German empire with a Prussian king as hereditary emperor. When a permanent government was established, he was sent as Minister to Turin and Naples and in 1853 to Vienna. Later he helped to organize the Pan-German party.

HEC'LA, or **HEK'LA**. A volcano in Iceland, situated in the southwestern part of the island, about 20 miles from the coast. It has an irregular cone, built of lava, scoriae, and ashes, and bare of vegetation, which rises to a height of 5100 feet above the sea. There are several subsidiary craters, besides the principal crater on the summit, and the cone is dissected by deep ravines, through which torrents rush down from the snow fields above. The volcano has an extremely wild and desolate appearance. Eruptions take place at irregular intervals, the total number on record since the discovery of Iceland being 28. The most violent outbursts occurred in 1157, 1300, 1597, 1636, and 1766. In the last-named year a large area was buried beneath the ejected lava and ashes. The volcano was again active from September, 1845, to April, 1846, and in March, 1878. See ICELAND.

HECTARE, or **HEKTARE**, **HECTOGRAM**, **HECTOLITER**, **HECTOMETER**. See METRIC SYSTEM.

HEC'TIC FEVER (from Gk. *ἐκτικός*, *hekτικός*, consumptive, from *ἔξω*, *heis*, condition, from *ἔχειν*, *echein*, to have). A type of fever, usually associated with tubercular disease, abscess, or septicæmia, distinguished by an afternoon or evening rise of temperature, during which the patient has bright eyes, flushed cheeks, and some nervous excitement, while afterward the temperature falls and profuse perspiration occurs. It is a common symptom of chronic suppuration from whatever cause, when the wound cannot be kept aseptic and well drained. The periodic rise in temperature is attributable to chronic blood poisoning, depending on the absorption of small quantities of the products of putrefaction or fermentation. The treatment must be directed towards the existing disease, of which it is generally a grave symptom.

HEC'TOR (Lat., from Gk. *Ἡκτορ*). The leader and mightiest warrior in the Trojan

army, son of Priam and Hecuba, husband of Andromache, and father of Astyanax or Scamandrius. In the *Iliad* he appears as brave in battle, but hasty and often imprudent; he is also full of reverence for the gods, tender love for his family, and devoted patriotism. During the absence of Achilles from the fight he storms the Greek camp and penetrates even to the ships. He is driven back by Patroclus, the friend of Achilles, but at length, by the help of Apollo, slays Patroclus. Roused by a thirst for vengeance, Achilles is reconciled with Agamemnon and in divine armor routs the Trojans with fearful slaughter, and finally, after chasing Hector three times round the walls of Troy, slays him by the help of Athena and drags the body at his chariot wheels to the Greek ships. Here the corpse is miraculously preserved from corruption by the gods and finally ransomed by Priam. With the burial of Hector the *Iliad* closes. In the post-Homeric literature little is added to the picture of Hector. At Ilium he was worshiped as a hero, and similar offerings were made at Thebes, whither it was said an oracle had commanded the removal of his bones. In art the combats of Hector with various Greek heroes, his death, the maltreatment of his body, and his ransom are favorite subjects.

The name "Hector" has been given to one of the minor planets in the plane of Jupiter's orbit.

HECTOR, ANNIE (FRENCH) (1825-1902). A British novelist, best known by her pseudonym "Mrs. Alexander," born in Dublin, Ireland. She began writing at an early age, but with so little success that on her marriage she laid aside her pen and resumed it only when the death of her husband obliged her to seek some means of maintenance. Among her novels, some of which met eventually with considerable success, are: *The Wooing O'!* (1873); *Her Dearest Love* (1876); *By Woman's Wit* (2 vols., 1886); *Mona's Choice* (1887); *A Life Interest* (3 vols., 1888); *A Winning Hazard* (1896); *Barbara: Lady's Maid and Paces* (1897).

HECTOR, or **ECTOR**, SIR. The name of two knights in Arthurian legend. See ECTOR.

HEC'UBA (Lat., from Gk. *Ἡκάβη*, *Hekabē*). The second wife of Priam, King of Troy, to whom she was said to have borne 19 children, including Hector, Paris, Helenus, Cassandra, Deiphobus, Polydorus, and Troilus. In the *Iliad* Hecuba appears as bringing offerings to Athena, trying to restrain Hector from battle, and lamenting his death. The tragedians, and especially Euripides (q.v.), basing their work on the later epics, developed her story, and it served as a source for still later poets. Before the birth of Paris she dreamed, it was said, that she bore a blazing torch which fired the whole city. From dread of the meaning of this omen, Paris was exposed. Another episode was her vengeance on Polymestor, King of Thrace, to whom Priam had sent his son Polydorus and much treasure for safe-keeping. Polymestor murdered his ward and threw the body into the sea, which bore it to the shore of the Troad, where it was discovered by a servant of the now captive Hecuba. She then enticed Polymestor to her tent and with her attendants slew his sons before his eyes and blinded him. The loss of Polydorus was only one of her sufferings after the capture of Troy, for she saw her husband and her sons slain, her grandson Astyanax, son of Hector, thrown from the walls of Troy, and her daughter Polyxena sacrificed at the

omb of Achilles, while the lot assigned her as slave to her most hated enemy, Odysseus. The legends of her end varied, as in one version she was transformed into a dog, which sprang into the sea and was drowned (consult Ovid, *Metamorphoses*, iii, 399-575), while in another her lamentations and curses so angered the Greeks that they stoned her. Her name became proverbial for a sorrowful fate. Some have regarded her as a goddess to whom dogs were sacred.

HECUBA, or **HEC'ABE**. A tragedy by Euripides, produced about 424 B.C. It deals with the revenge of Hecuba on Polymestor, King of Thrace, who had murdered her youngest son, Polydorus, previously consigned by Priam to his guardianship. The tragic pathos of the play is also heightened by the introduction in the first part of the story of Polyxena, the daughter of Hecuba, who was sacrificed by the Greeks to the shade of Achilles. The play is somewhat lacking in unity.

HECYRA, hēs'ī-rā (Lat., from Gk. Ἑκυρά, mother-in-law). A comedy by Terence, produced n 165 B.C.

HEDA, hā'dā, WILLEM CLAESZ (c.1594-1678). A Dutch still-life painter. He was born probably at Haarlem. It is unknown under whom he studied, but he was prominent among artists, having been dean of the Haarlem Guild n 1631 and in 1651. Aside from this nothing is known of the events of his life. He is one of the most attractive of the Dutch still-life painters. Although minute in execution, his paintings are good in color and admirably composed. His subjects are usually "breakfast pieces," sometimes elaborate in character—food upon rich plate, oysters with the peeled lemon, bread, wine in stately beakers, and pastry; at others a more humble repast—ham, bread, walnuts, and beer. He is well represented in almost all important German and Dutch galleries: also at Vienna, in the Louvre, and in the National Gallery, London.

HEDBERG, hēd'bēr-g, FRANS TEODOR (1828-1908). A Swedish dramatist, born at Stockholm. He was appointed reader, and then teacher, at the Royal Theatre in Stockholm (1861), and later director of the New Theatre, Gothenburg (1881). In 1883 he gave up this position to devote himself entirely to writing. His works include comedies, tragedies, poems, etc. The best known of his plays is *Brölloppet på Ulfåsa* (1865). He also wrote *Karakteristiker och Porträtter af Svenska Skådespelare* (1884) and *Karakteristiker och Porträtter af Svenska Operasångare* (1885), besides other works dealing with theatrical subjects.—His son FOR (1862-) wrote novels of abnormal psychology, including *Judas* and *Ouf Torpa* and dramas of like character, among them *Gerhard Trim* (1897), *Amor och Hymen* (1905), the drama *Johan Ulfstierna* (1907), and the reclusive tragedy *Mikael* (1908).

HEDDA GABLER, hēd'dā gā'blēr. A play by Henrik Ibsen (1890), and the name of its heroine, an eccentric woman who, disappointed in her marriage with a young savant, attempts to regain her influence over a former lover, Eilert, now under the good influence of a former school friend of Hedda. He loses the manuscript of a new work which is to make him famous, and Hedda's husband finds it, but she destroys the work. When Eilert, in despair, thinks of suicide, she gives him a pistol with

which he ends his life in a low resort, and Hedda kills herself.

HED'DING, ELIJAH (1780-1852). An American Methodist Episcopal bishop. He was born in Pine Plains, Dutchess Co., N. Y., and began to preach in Vermont when 19 years old. During most of the time between 1807 and 1824 he was presiding elder in New Hampshire, in Portland, Me., and in Boston. In 1824 he was elected Bishop, and during the formative period of the church's growth he exercised a powerful influence. He was one of the founders of *Zion's Herald*, the first Methodist paper in the country, and author of a *Discourse on the Administration of Discipline* (1842). Hedding College, Abingdon, Ill., was named for him. Consult D. W. Clark, *Life and Times of Rev. Elijah Hedding*, D.D. (New York, 1855).

HED'DLE, or **HEALD** (of Scandinavian origin; cf. Icel. *hafald*, thrum for holding the weft). In weaving, the threads of the warp are so arranged that at each passage of the shuttle backward and forward a certain number of the warp threads are raised and the remainder lowered; this is done with vertical threads, cords, or wires, with a small loop in the middle through which the warp thread is passed, there being one of the vertical threads for each horizontal or warp thread. These threads or wires are known as heddles, or healds. See LOOM.

HEDENSTIERNA, hā'den-styēr-nā, KARL JOSEPH ALFRED (1852-1906). A Swedish author, born at Vedåsa (Småland province). In 1879 he became connected with the staff of the *Smålandsposten* at Vexjö and in 1890 was made editor in chief of that journal. In addition to several volumes descriptive of Swedish peasant life, he wrote a series of popular humorous articles, published weekly in the *Posten* over the name "Sigurd" and in part collected in a translation into German by Krusenstierna and Langfeldt, entitled *Allerlei Leute* (Leipzig, 1892-97). His best works are: *Stuta-Perssons Josua* (1899), *Svenssons* (1903), *Petterssons Lina* (1906).

HEDEWARY. See KHUEN-BELASI-HEDEWARY.

HEDGE (AS. *hecga*, *hege*, OHG. *hecga*, *hegga*, Ger. *Hecke*, hedge; connected with AS. *hege*, Eng. *hay*, and AS. *hēawan*, Eng. *hew*). A fence formed generally of growing shrubs or trees and cultivated either for defense or ornament. Hedges are much used in England, Italy, and in other countries where wood for fences is scarce. For many situations they are particularly adapted, owing to the protection which they afford from high winds. The height to which they are permitted to grow should be accommodated to the requirements of the locality. Hedges in Great Britain are generally formed of hawthorn (q.v.). Beech hedges are very common around gardens and pleasure grounds, and a hedge of beech and hawthorn mixed is common in many places. Holly makes an excellent ornamental hedge, much in use for gardens and pleasure grounds. Ornamental hedges are sometimes formed of yew, hornbeam, lime, and other trees. In the United States osage orange (*Maclura aurantiaca*) and honey locust (*Gleditsia triacanthos*) are considered the best hedges for fence purposes. For ornamental hedges California privet (*Ligustrum ovalifolium*), Norway spruce (*Picea excelsa*), American arbor vitae (*Thuja occidentalis*), common hemlock (*Tsuga canadensis*),

sis), Japan quince (*Cydonia japonica*), *Deutzia scabra*, and some spireas and viburnums are used.

HEDGE, FREDERIC HENRY (1805-90). An American clergyman, critic, and philosopher, born at Cambridge, Mass. He was a son of Levi Hedge, professor of logic and metaphysics in Harvard College. He studied in Germany under the care of George Bancroft from 1818 to 1823 and graduated at Harvard (1825) and from the Divinity School at Cambridge in 1828, becoming a Unitarian minister. In 1857 he was made professor of ecclesiastical history in the Harvard Divinity School and editor of the *Christian Examiner* (1857-60). From 1872 to 1881 he was professor of German at Harvard. To literary criticism he contributed *Prose Writers of Germany* (1848) and *Hours with German Classics* (1886); to religious and philosophical criticism: *Reason in Religion* (1865); *The Primeval World of Hebrew Tradition* (1870); *Martin Luther and Other Essays* (1888). He wrote also several hymns and translations from the German poets and prepared a liturgy for the Unitarian church (1856). His chief significance to American thought was the attention his work called to German scholarship and literature.

HEDGE/BOTE'. See HAYBOTE.

HEDGE/HOG'. One of a genus (*Erinaceus*) of insectivorous quadrupeds, the type of the family Erinaceidae. The muzzle is rather elongated, the neck short, the limbs short, the feet five-toed, the claws strong, the tail short, the body covered with short spines on the upper part and with hair below and capable of being rolled up into a ball. The teeth are 36 in number, 20 in the upper jaw and 16 in the lower; the middle incisors are very long and stand forward. Like many other insectivora, hedgehogs are by no means limited to insect food, but prey on larger animals, as reptiles, small quadrupeds, and birds; they are fond of eggs and of milk and in confinement will readily eat soaked bread, cooked vegetables, or porridge. Their power of rolling themselves into a ball, from which the spines project on every side, is their means of protection from enemies. The spines are curiously bent near the root and so set that on the contraction of the muscles by which the animal rolls itself up they are held firmly in their position, their points towards the adversary. They are very strong and sharp, and their elasticity is so great that the animal can sustain falls from considerable heights without apparent injury.

The common hedgehog (*Erinaceus europaeus*) is a native of all Europe and of western Asia. Its short ears are one of its distinctive specific characters. It is seldom more than 9½ inches in length. Its spines are about an inch long. It readily kills snakes, and even vipers, which it eats, beginning always at the tail. It brings forth from two to four young at a birth and provides for the occasion a curiously constructed nest, mostly of dry leaves, of which the roof is capable of throwing off the rain. The young are blind at first, their ears are closed, and their bodies are covered with soft, incipient spines. In winter the hedgehog becomes torpid, retiring to a hole at the base of a tree, beneath roots, or in some such situation. It provides no winter store, and few animals hibernate so completely. The hedgehog is easily tamed, becomes very familiar, and is very useful in houses where cockroaches are troublesome. Night is its period

of activity. Its flesh is eaten in some parts of Europe, but in Great Britain only by gypsies, who roll the animal up in a ball of clay and so roast it. Spain, Italy, and Sicily have each their subspecies of the common hedgehog. About 18 other species of hedgehogs are found in different parts of Asia and Africa, but no closely related animal is included in the American fauna. See Plate of PORCUPINES AND HEDGEHOGS.

HEDGEHOG PLANT (so called from the shape). A name given to those species of medic (*Medicago*) in which the pods are spirally twisted and rolled up into a ball, beset with spines. The peculiar appearance of the pods makes them objects of interest, on which account they sometimes find a place on flower borders. Like other medics, they are useful as sheep and cattle food in countries where they abound. They are particularly plentiful on sandy grounds near the sea in some parts of South America, and their burlike pods are often abundant in South American wool. *Medicago hispida*, the bur clover, is frequently sown in the Southern States for winter pasture.

HEDGE HYSSOP. See GRATIOLA.

HEDGE MUSTARD, *Sisymbrium*. A genus of plants of the family Cruciferae, mostly annual or perennial herbs, with various foliage, yellow or white flowers, and long, roundish, or six-angled pods. Several species are natives of Europe, of which one, the common hedge mustard (*Sisymbrium officinale*), was once employed in medicine for catarrh and other ailments, and still is sometimes cultivated as a potherb on account of its mild pungency. It is abundantly introduced into the United States, where it is considered a troublesome weed. Broad-leaved hedge mustard, or London rocket (*Sisymbrium irio*), is said to have sprung up in great abundance on the ground desolated by the fire of London in 1666. There are a number of other weedy species. *Sisymbrium sophia* is sometimes known as slixweed. *Sisymbrium alliaria*, or *Alliaria officinalis*, has a garlic-like odor. *Sisymbrium altissimum*, a recent introduction into America, where it is known as tumbling mustard, has become a troublesome weed in many localities.

HEDGE NETTLE. See STACHYS.

HEDGES, hēj'ez, JOB ELMER (1862-). An American Republican politician and lawyer. He was born at Elizabeth, N. J., and graduated from Princeton University in 1884 and from Columbia Law School in 1886. He was secretary to Mayor Strong of New York City in 1895-97, city magistrate in 1897-98, and for a time Deputy Attorney-General of New York; was appointed to represent the United States on the International Fisheries Commission; in 1912 was the candidate of the Republican party for Governor of New York; and in 1914 was defeated (at the first direct primaries) for the governorship nomination by Charles S. Whitman. As a lawyer, his practice was in connection with the firm of Hedges, Ely, and Frankel of New York City. St. Lawrence University conferred on him the degree of LL.D. in 1914. He became noted as a public speaker and is author of *Common Sense in Politics* (1910).

HEDGES, KILLINGWORTH (c.1845-). An English engineer, privately educated. He worked on the North Holland Sea Canal and the Denver and Rio Grande Railway, installed an electric-lighting plant at the Liverpool docks in 1878, was one of the first to install electric

lights on steamships, and about 1899 turned his attention to lightning conductors. He modified the Clerk Maxwell system, substituting rain pipes for ordinary lightning rods, and in 1900 was a leader in forming the Lightning Research Committee, whose report was published in 1905. He wrote: *Continental Electric Light Central Stations* (1892); *American Electric Street Railways* (1894); *Modern Lightning Conductors* (1905).

HEDGE SPARROW, **HEDGE WARBLER**, or **DUNNOCK**. A familiar European warbler (*Prunella modularis*). It is not quite as large as the house sparrow, which it somewhat resembles in dull-brownish plumage, but in little else. It feeds principally on insects. It is one of the earliest spring songsters, having a sweet plaintive song. The nest, of green moss, roots, and wool, lined with hair, is usually placed rather low in a bush or hedge. The eggs are four or five in number, of a delicate and spotless bluish green.

HEDIN, hē-dēn', SVEN ANDERS (1865-). A Swedish explorer, born at Stockholm and educated there and at Upsala (1885), at Berlin and at Halle, where in 1892 he received the doctorate. He traveled in southwestern Asia in 1885-86 and gave an account of his journey in *Genom Persien, Mesopotamien och Kaukasien* (1887); was a member of the Swedish commission to Teheran, which he described in *Konung Oscar's beskickning till Schahen af Persien* (1892). In the years 1894 to 1897 he traveled through East Turkestan, the Pamir, the Takla-Makan Desert, northern Tibet, and the Desert of Ordos, reaching Peking and returning west through Mongolia and Siberia, and in the latter year won the Karl Ritter medal from the Berlin Geographical Society. These journeys, performed at times amid extraordinary hardships, were described in *Through Asia* (1899), which made the author's reputation in England and America; and, less popularly, in *Petermanns Mitteilungen* (1900): "Die geographisch-wissenschaftlichen Ergebnisse meiner Reisen in Central Asien, 1894-97." Hedin's expedition of 1899-1902 explored the lower course of the Tarim, the country between it and the Tchertchen-Darya, the region of Lom-Nor, the Desert of Gobi, and the greater part of Tibet. He made two unsuccessful attempts to enter the sacred city of Lhasa. In 1906-08 he made another expedition to Tibet, the geographical results of which were noteworthy. On this occasion he took a number of meteorological observations which constitute the first record of the kind for this region. His memoir on the physical geography of Tibet studied on this trip was equally important. The data accumulated on this trip enabled him to compile the first detail map, on a scale of 1 to 1,000,000, of that section of Asia. In 1911 he was elected a member of the Paris Academy of Sciences; in 1912 he was raised to the nobility by the King of Sweden in recognition of his work, and in 1914, at the request of the German Emperor, he visited Belgium to investigate destruction caused there by the war in Europe. His best-known work is *Scientific Results of a Journey in Central Asia* (6 vols. and 2 vols. maps, Stockholm, 1904-08).

HEDJAZ. See **HEJAZ**.

HEDJAZ (hēj-az') **RAILWAY**, THE. See **TURKEY**.

HEDLEY, hēd'li, JOHN CUTHBERT (1837-1915). An English Benedictine and Roman

Catholic bishop. He was born at Morpeth, was educated at Ampleforth College, Yorkshire, and in 1854 entered the English Congregation of the Benedictine Order. He was ordained priest in 1862, was consecrated auxiliary Bishop in 1873, and in 1881 became Bishop of Newport. He wrote several volumes of sermons: *Christian Inheritance* (1894); *A Retreat* (1895); *Lex Levitarum* (1905); *The Holy Eucharist* (1907).

HE/DONISM (from Gk. ἡδονή, *hēdonē*, pleasure; connected with ἡδύς, *hēdys*, Lat. *suavis*, Goth. *suts*, OHG. *suozī*, Ger. *süss*, Eng. *sweet*, Skt. *svādu*, sweet, from *svad*, to make pleasant, to taste). The theory that pleasure is the highest human good (ethical hedonism), or that pleasure is the only end that can be pursued (psychological hedonism). The distinction between these two types of hedonism has not always been kept clear, and the result is that the history of hedonism often presents very confusing because confused systems. In the very brief outline we shall give of this history we shall not distinguish between these two types of hedonism, although a critical estimate of hedonism would require this distinction. Such an estimate we shall give briefly in the last two paragraphs. In Occidental speculation hedonism appeared very early and was vigorously asserted by many sophists (q.v.). Aristippus (q.v.) and his school (see **CYRENAIC SCHOOL**) made hedonism their central doctrine. Aristippus seems at times to have insisted upon the supreme value of the pleasure of the moment and to have lost sight of the necessity, even for securing pleasure, of considering the future. But while many of the sayings attributed to him have this irrational character, the value he set upon insight would seem to indicate that it was not his intention to hold up as ideal the man who completely ignored all the hedonic consequences of his action. Epicurus (q.v.) laid more emphasis on the desirability of choosing "productive" pleasures, to use Bentham's phraseology, i.e., pleasures whose consequences are not painful. But however they differed in other points, all the ancient hedonists were agreed that the pleasure of the agent was, for the agent himself, the supreme end. A disinterested desire for some one else's good was not recognized as possible; or, if possible, it was regarded as perverse. Early modern hedonists (see **HOBBS**; **LOCKE**) were almost or quite as individualistic as the ancients. But with Cumberland, Hutcheson, and Hume, a new phase of hedonism was introduced, viz., the theory that not the agent's greatest pleasure, but "joy in widest commonalty spread," is the supreme end of moral action (universalistic hedonism, or utilitarianism, q.v.).

Psychological hedonism is controverted by well-known facts. So far is man from always seeking pleasure that in most of his actions he has no thought of pleasure. He acts from automatic impulse, from instinct, from habit, from desire for certain objective ends, as well as occasionally from desire for pleasure. It has even been denied that there can be any desire for pleasure, although this is, without doubt, an extreme position. The tendency among many writers at the present day is to maintain that the affections, i.e., pleasantness and unpleasantness, are the motives or mainsprings of *voluntary* action, and not that pleasure and the avoidance of pain is the end of action. The difference between a motive and an end is that between an efficient and a final cause (see **CAUSALITY**), although it

should be remarked that motive is often used as synonymous with end. This view that the affections are the motives of actions, so far as these actions are voluntary, is not to be confused with hedonism as above defined, which is a theory of ends, not of cause. However, the term "hedonism" has sometimes been used to designate this view.

Ethical hedonism is beset at the outset with one great difficulty. It is often argued that hedonism is not practicable unless all pleasures can be compared in some way with each other. Who shall say whether the pleasures of the table are greater or less than those of the opera? The question can be only approximately answered by each individual according to his own tastes. And even such an answer can claim no uniform applicability. At one time, e.g., when extremely hungry, even the most enthusiastic lover of music might prefer beefsteak to Wagner, while just after an epicurean banquet the gourmand might temporarily prefer music. The greatest sum of pleasures either for the agent or for the race would be a very difficult ideal to set before one, except in the abstract—too difficult, perhaps, to make it the criterion of morality for the ordinary man. But the difficulty of it must not be a bar if on sufficient ground it can be proved that man *ought* to seek the greatest pleasure either of himself or of others. But how are we to prove that such an obligation obtains? The final appeal of hedonists is generally to reason, it being maintained that the reasonable man invariably prefers the greatest pleasure to anything else. Consult: Watson, *Hedonistic Theories from Aristippus to Spencer* (Glasgow, 1895); Sidgwick, *The Methods of Ethics* (6th ed., London, 1901); J. C. Palmer, *A Plea for Hedonism* (Wooster, Ohio, 1903); Max Zerbst, *Die Philosophie der Freude* (Leipzig, 1904). Consult the authorities referred to under UTILITARIANISM; ETHICS.

HÉDOUIN, á'dwān', EDMOND (1820-89). A French painter, etcher, and lithographer. He was born at Boulogne-sur-Mer and studied painting under Delaroche and etching under Nanteuil. He began as a painter of genre and landscape scenes of peasant life, especially in Spain and the Orient; and he painted decorative pieces in the Théâtre Français and the Palais Royal. One of his landscapes, "Gleaners Overtaken by Storm" (1857), is in the Luxembourg. But it is chiefly as an etcher that he established a deserved reputation. In this medium he copied the works of Teniers, Boucher, Millet, Bida, and others, and illustrated the entire works of Molière (1881-91), Rousseau's *Confessions*, and Sterne's *Sentimental Journey*.

HÉDOUVILLE, á'dū'vél', GABRIEL MARIE JOSEPH THÉODORE, COUNT D' (1755-1825). A French general and diplomat, born at Laon and educated at La Flèche and at the Military School. In 1797 he was made Governor of Santo Domingo, but was unable to cope with Toussaint L'Ouverture, and returned to France two years afterward. In 1801 he was made Minister to Russia, in 1805 went on diplomatic missions in Italy, and, with Josephine, to Strassburg and Munich. After the peace with Austria he was Plenipotentiary at Frankfort, but in 1814 voted for the overthrow of the Empire. He was made Count in 1818 and was appointed to the commission on the disputes between France and the Grand Duchy of Warsaw.

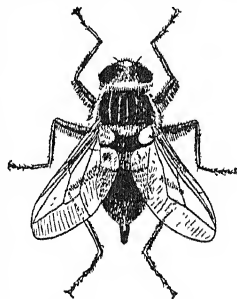
HEDWIG, hāt'vīk (1174-1243). The patron saint of Silesia, a daughter of Berthold IV of Meran. In her twelfth year she was married to Duke Henry I of Silesia, who died in 1238. She entered a Cistercian cloister which she had founded near Breslau, and died there. Consult *Sainte Hedwige* (Bar-le-Duc, 1895).

HEDWIG, or **JADWIGA**, yād-vē'gā (1371-99). Queen of Poland, daughter of Louis the Great of Poland and Hungary. After his death (1382) the Poles put her on the throne. In 1386 she married Jagellon of Lithuania, who embraced Roman Christianity and became known as Wladislaw (Ladislas).

HEEL FLY. A local name in the Southern and Western States for the ox botfly (*Hypoderma lineata*), derived from the fact that the adults hover around the heels of cattle for the purpose of laying their eggs on the hairs, whence they will be licked off. See BOT.

HEEM, hām, JAN DAVIDSZ DE (1606-84). The most celebrated still-life and flower painter of the Dutch school. He was born at Utrecht and studied under his father, David de Heem, a painter of still life. We know but little of his life. In 1620, and during the years following, he was active at Leyden, and in 1635 he became a member of the Painters' Guild, and in 1637 a burgher, of Antwerp. In 1667 he returned to Utrecht, but during the French invasion of 1672 he fled to Antwerp, remaining there until his death in 1684. Heem's pictures represent for the most part vases or garlands of flowers, dishes of fruits, musical instruments, and ornaments of various kinds. They are often of moral intent and point a lesson, as in the subjects called "Vanitas." They were at first small in size, in the brown tones, and with the detailed execution of the earlier Utrecht painters. Then his treatment became more pictorial, the arrangement more skillful, the tone and chiaroscuro more delicate—apparently under the influence of the youthful Rembrandt, who was then at Leyden. At Antwerp he was influenced by Seghers, and his work became more grandiose in form; but it remained essentially Dutch in its minute and loving fidelity to nature and pronounced chiaroscuro. Even in his own day his work was popular and commanded high prices. It is now found in nearly all the principal galleries of Europe, especially in those of Holland, Belgium, and Germany.—The DE HEEM family embraced a number of painters devoted to still life. Jan's brother, David Davidsz, and his cousin, Jan, his three sons, David, Cornelis, and Jan, and even his grandson, David Cornelis, practiced the art. By far the most important was his son and pupil, CORNELIS (1631-95), who is recorded as member of the guild at Antwerp and as practicing at The Hague in 1678. Although his style resembles his father's sufficiently to be often confounded with it, his work is not of equal excellence. He is represented in the principal European museums. Consult Bode, *Great Masters of Dutch and Flemish Painting* (London, 1909).

HEEMSKERK, hāms'kērk, MARTIN VAN,



HEEL FLY.

properly MARTIN VAN VEEN (1498-1574). A Dutch historical and portrait painter. He was born at Heemskerk, near Haarlem, where his father was a field laborer. He first studied at Haarlem under Jacob Willemsz, later with Jan Laicasz at Delft, and again at Haarlem under Jan Scorel, from whom he derived his predilection for Italian art. In 1532-37 he journeyed to Italy, stopping at Rome, where he was greatly influenced by Michelangelo. After his return to Haarlem he quickly acquired a great reputation and painted many altarpieces for Haarlem, Amsterdam, Alkmar, Delft, and other Dutch cities, destroyed in the religious wars which followed. He was dean of the Painters' Guild in 1540. Although a man of considerable talent, his painting, except portraits, is little more than a mannered imitation of the Italian. He seems also to have made architectural designs, e.g., the Houtpoort (a gate of Haarlem, now destroyed), designed glass paintings and tapestries, and also etched a few plates. A large part of his artistic activity consisted in designing line engravings executed by others, which he was the earliest artist in Holland to do. Over 600 of such engravings survive. His surviving paintings are best represented in the gallery of Haarlem, which possesses "St. Luke Painting the Virgin" (1532); "Ecce Homo" (a triptych, now transferred to canvas); "The Brazen Serpent"; and three others. In the cathedral of Linköping, Sweden, is a colossal altar with the "Scenes from the Passion" and the "Life of St. Lawrence." Heemskerk is also represented at Delft, The Hague, Berlin, Vienna, and by a portrait of his father, Jacob van Veen (1532), in the Metropolitan Museum, New York. Two sketchbooks by him are in the Berlin Museum, besides which 189 drawings, mostly in the Cabinet of Engravings, Copenhagen, survive. Consult his biography by Freibisz (Leipzig, 1911).

HEEP, URIAII. A very "umble" person and a most egregious hypocrite in Dickens's *David Copperfield*.

HEER, hār, OSWALD (1809-83). A Swiss naturalist, born at Nieder-Utzwyl. He was director of the botanical gardens at Zurich (1835-83), and after 1851 professor of botany at the University of Zurich and at the Polytechnicum. His earliest publications were on entomology, but his most important contributions to science were his works on the fossil plants and insects of the Tertiary period, notably *Flora Tertiaria Helvetica* (3 vols., 1854-58); *Die Urwelt der Schweiz* (1865; 2d ed., 1879); *Die fossile Flora der Polarländer* (7 vols., 1868-83); *Beiträge zur Kreideflora* (1869-72); *Flora Fossilis Helvetica* (1877). Consult J. J. Heer and Schröter, *Oswald Heer, Lebensbild eines schweizerischen Naturforschers* (Zurich, 1885-87), and Malloizel, *Oswald Heer: Bibliographie et table iconographique* (Berlin, 1888).

HEEREN, hā'ren, ARNOLD HERMANN LUDWIG (1760-1842). An eminent German scholar, born at Arbergen, near Bremen, where his father was at that time pastor. He was educated at the cathedral school of Bremen and at the University of Göttingen. His first published work was an edition of Menander's *De Encomiis* (1785); somewhat later appeared the *Eclogæ Physicae et Ethicae* of Stobæus (1792-1801). In collecting materials for the latter he visited Italy, the Netherlands, and France. In 1794 he was appointed professor of philosophy, and in 1801 professor of history, at Göttingen. In

1793-96 appeared at Göttingen his *Ideen über Politik, den Verkehr und den Handel der vornehmsten Völker der alten Welt* (4th ed., 6 vols., 1824-26; Eng. trans., Oxford, 1833). This work has secured him a place among the most eminent modern historians and is still of much value because in it for the first time proper heed was given to such matters as the constitutions, the economic relations, and the financial systems of the ancient peoples. If his *Geschichte des Studiums der klassischen Literatur seit dem Wiederaufleben der Wissenschaften* (2 vols., 1797-1802; 2d ed., 1822) proved less satisfactory to scholars, his *Geschichte der Staaten des Altertums* (5th ed., 1826; Eng. trans., Oxford, 1840) and his *Geschichte des europäischen Staatensystems und seiner Colonien* (5th ed., 1830) abounded in new views and acute expositions. For his *Versuch einer Entwicklung der Folgen der Kreuzzuge* (1808), he received the prize from the Institute of France. His *Vermischte historische Schriften* (1803-08) contain some very interesting treatises. In 1821-30 he published an edition of all his historical works (*Historische Werke*), in 15 volumes, at Göttingen.

HEERINGEN, hā'ring-en, JOSIAS O. O. VON (1850-). A German soldier, born at Kassel. He was educated in the Gymnasium of his native city, later was member of a cadet corps, and in 1867 entered military service in the Eightieth Regiment of Foot Guards. He was a sublieutenant in the Franco-Prussian War, after which he was promoted through the various grades to that of captain (1880), major (1887), and colonel (1895), during this time seeing varied service. His ability as an organizer and administrator resulted in his appointment to major general in 1898 with directorship of the army administration department in the War Ministry. There followed his promotion to lieutenant general (1901), after 1903 with command of the Twenty-second Division, and to general of infantry with command of the Second Army Corps (1906). In 1909 Heeringen entered the ministries of State and War and became inspector general. For his part as a leader of the German army in 1914, see WAR IN EUROPE.

HEERMANN, hār'mān, HUGO (1844-). A distinguished German violinist, born at Heilbronn. He studied at the Brussels Conservatory under Meerts, Fétis, and De Bériot. In 1865 he became concert master of the Museum Konzerte at Frankfurt. When in 1878 the Hoch Conservatory was established, he was appointed principal violin professor. In 1904 he resigned and established a private violin school. He came to America in 1907 as concert master of the Chicago Symphony Orchestra. As a soloist, he plays rather in scholarly than temperamental fashion. He was one of the very first violinists to play the Brahms concerto, at a time when that noble work was regarded as a monstrosity. His greatest fame is as a quartet player. In 1914 he accepted the headship of the violin department at the Geneva Conservatory.

HEERMANS, A. See HERRMANN, A.

HEFELE, hā'fe-le, KARL JOSEPH VON (1809-93). A Roman Catholic bishop and scholar. He was born at Unterkochen, not far from Stuttgart, Württemberg, March 15, 1809, graduated at Tübingen, and in 1840 received a professorship in the Catholic theological faculty, where he lectured on Church history, Christian

archæology, and patrology. From 1842 to 1845 he was a member of the Württemberg Chamber of Deputies. He was consecrated Bishop of Rottenburg in 1869 and took a prominent part in the Vatican Council, where he was foremost among those who spoke and voted against the dogma of papal infallibility. In 1870 he published *Causa Honorii Papæ* against it. At first he refused to proclaim it in his diocese, but on April 21, 1871, did so, and in 1872 gave his public assent to it on the ground that to refuse assent to what the church had proclaimed would be to "set his own infallibility in the place of the infallibility of the church." In 1874 he declined the archbishopric of Freiburg offered to him by the Baden government, on the ground that he could not take the oath which was demanded from the bishops in Prussia and Baden. His most important work, based on the study of original materials, is the *Konziliengeschichte*, a history of the councils of all grades, in nine volumes. Hefele's part of the work extends to the Council of Florence, but, with Hergenröther's appendix, the work goes to Trent. The English translation (5 vols., Edinburgh, 1871-96) goes as far as 738. Hefele's *Life of Ximenes* (1844) has been translated (London, 1860). He died in Rottenburg, June 5, 1893.

HEFFERNAN, MR. MICHAEL. The nom de plume which Samuel Ferguson signed to *Father Tom and the Pope*, or *a Night at the Vatican*.

HEFFTER, hē'fēter, AUGUST WILHELM (1796-1880). A German jurist, educated at Berlin and Leipzig. In 1820 he was a judicial assessor in Cologne and from 1821 to 1823 practiced law in Düsseldorf. He was made professor at Bonn (1823), at Halle (1830), and at Berlin (1832). From 1849 he was a member of the First Chamber of the Prussian Diet, in 1861 was appointed Crown Syndic and became as such life member of the Prussian Upper House. He wrote: *Institutionen des römischen und deutschen Civilprozesses* (1825); *Das europäische Völkerrecht der Gegenwart* (8th ed. by Geffken, 1888); *Lehrbuch des gemeinen deutschen Strafrechts* (6th ed., 1857); *Die Sonderrechte der souveränen und mediatisierten Häuser Deutschlands* (1871); and, on current history, *Der gegenwärtige Grenzstreit zwischen Staats- und Kirchengewalt* (1839).

HEFNER UNIT. A primary standard of illumination equal to 0.90 international candle. It is the official German standard of light, and is a wick lamp of fixed design and dimensions, which under standard atmospheric conditions burns amyl acetate, whose chemical and physical properties are specified. See **PHOTOMETRY**.

HEGAN, ALICE CALDWELL. See **RICE, ALICE HEGAN**.

HEGAR, hā'gār, FRIEDRICH (1841-). A Swiss composer, born at Basel. He studied at the Leipzig Conservatory under several famous teachers and in 1860 became leader of the Bilse Orchestra at Warsaw. In 1863 he settled in Zurich, where he became a well-known conductor and in 1876 founded a school of music. He composed some piano and violin music, but became best known for his male choruses and songs. His oratorio, "Manasse," was highly successful and is a striking work.

HEGEL, hā'gel, GEORG WILHELM FRIEDRICH (1770-1831). One of the greatest German philosophers. He was born Aug. 27, 1770, at Stuttgart and became in 1788 a student in the University of Tübingen, where his speculative

abilities, however, were outshone by his younger companion, Schelling, who, together with Hölderlin, exercised a great intellectual influence on him. In the university he studied theology, philosophy, and natural science, and was interested in political events and theories. His diploma described him as having good parts, but did not mention him as distinguished for his knowledge, philosophical or otherwise. After leaving the university in 1793, he was a private tutor at Bern and Frankfort-on-the-Main for seven years, during which period he continued his studies in philosophy and theology and wrote a *Life of Jesus*, which, however, was never published. In the beginning of 1801 he left Frankfort for Jena, where he published his first work, *Ueber die Differenz des Fichteschen und Schellingschen Systems der Philosophie* (1801), and entered the university as privatdozent. Next year he joined Schelling, to whose philosophy he seems at this time to have adhered, in the editorship of the *Kritisches Journal der Philosophie*. This alliance did not last long and soon turned into philosophical antagonism. His lectures in Jena did not attract much notice, but it was at this place, while the din of the battle of 1806 was sounding through the town, that he completed his first important work, *Phänomenologie des Geistes* (1807), which he used afterward to call his voyage of discovery. Shortly before the battle he had been made professor extraordinarius of philosophy; but the disaster which the war brought upon Jena compelled him to seek means of subsistence elsewhere, and he went accordingly, at Niethammer's request, to Bamberg, where he edited a political paper for a year or two. In 1808 he was appointed rector of the Gymnasium at Nuremberg, and there he had just completed the first edition of his *Wissenschaft der Logik* (1812-16), when he was called in 1816 to a professorship of philosophy in Heidelberg. There he published his *Encyclopädie der philosophischen Wissenschaften* (1817), in which he first developed his complete system. In 1818, however, he was called to Fichte's place in Berlin, and it was here that he first began to gather around him a new philosophical school. His lectures, which were delivered without rhetorical ornament, yet with an impressiveness due to the expression of laborious thought, attracted hearers from all ranks and professions. He rose to great political influence by reason of his defense of existing political institutions. This defense subsequently led his critics to charge him with time service; the charge, however, does him a great injustice. In 1821 he published his *Grundlinien der Philosophie des Rechts*, in which he gave expression to his ethical and political views. He demands in that work, among other things, representation of the people, freedom of the press, publicity of judicial proceedings, trial by jury, the administrative independence of corporations, and, above all, a monarch who shall "put the dot over the i," i.e., complete the constitution of the state. In the midst of an active life he was suddenly cut off by cholera, Nov. 14, 1831. He was buried beside Fichte. A complete collection of his works was published in 18 volumes (Berlin, 1832-41), some of them compiled from notes taken by his students. Of his works translated into English may be mentioned: *Philosophy of Mind* (Oxford, 1894) and *Logic* (2d ed., ib., 1892), translated by Wallace, both of which are portions of the

Encyclopadie; Philosophy of Right, translated by Dyde (London, 1896); *Philosophy of Religion*, translated by Spiers and Sanderson (ib., 1895); *Philosophy of History*, translated by Sibree (ib., 1857); *History of Philosophy*, translated by Haldane and Simpson (ib., 1892); *Hegel's Doctrine of Reflection*, translated by W. T. Harris, book ii of *Greater Logic* (New York, 1881); portions of book i of the *Greater Logic* by J. H. Stirling in his *Secret of Hegel* (2d ed., Edinburgh, 1897); *The Phenomenology of Mind*, by Baillie (London, 1910); *The Philosophy of Art* (New York, 1879).

It is impossible in this article to give any detailed account of Hegel's system of philosophy. He called it the system of the Absolute Idea. The idea is, for him, the indissoluble unity of the universe, existing in the two polar distinctions of subject and object. This idea is absolute because all-inclusive. The method by which Hegel arrived at this result he called dialectic (*Dialektik*), and by this he meant the process of exhibiting the incomplete character of any conception except the all-inclusive conception of the Absolute Idea. Thus, in his *Logik*, which expounds the method, Hegel begins with the conception of Being (*Sein*) and shows that it is not a complete conception, i.e., that it cannot be thought by itself. It is always only a partial conception and has no independence. The other part of the conception is Naught (*Nichts*). These two parts are not put together in any external way, but each is originally connected with the other. The organic unity of the two conceptions he calls Becoming (*Werden*). In the same way Becoming is not a complete thought; it is only part of a larger thought, which in its turn is part of a still larger, till at last we reach the thought of the Absolute Idea. But the *thought* of the Absolute Idea is itself only a partial fact if it is conceived as a mere conception, i.e., as something that has existed only "in the abstract medium of pure thought." Thought must have its objects. These objects we may try to conceive as existing apart from thought, but this conception is in its turn shown to be as incomplete as that of thought without object. The Absolute Idea, then, is not a conception in the ordinary sense of the word, but it is a fact, the fact of the inevitable union of thought and object of thought. Again, the inseparability is not spatial; it is doubtful whether it should be interpreted as even temporal. That is to say, Hegel does not mean that the act of thinking and the object thought must be in the same place or at the same time. All that he means is that whatever may be the temporal or spatial relation between the act of thinking and the object thought, the latter cannot be conceived as existing except either as an actual object of thought or as standing in necessary intelligible relation to some actual thought, just as the act of thinking cannot exist except in thinking some object. Though an interval of time may separate subject and object, an object which stands out of all relation to a subject or a subject which stands out of all relation to an object is inconceivable. In other words, all reality is one, in the sense that all real things, physical or psychical, are interconnected in such ways that their several reality is not something they have in isolation from the system of real things of which each is an integral part. Hegel's theology and the other parts of his system, such

as the philosophy of law, of nature, of art, and of mind, are too subtle to admit of treatment here. Indeed, even the short sketch of the dialectic, given above, would be rejected by many students of Hegel as inaccurate, so difficult is the task of interpreting Hegel.

Four years after Hegel's death a controversy was raised among his followers by Strauss's *Leben Jesu* (see STRAUSS) and was further embittered by Strauss's *Christliche Glaubenslehre*. The Hegelians then split into three sections, called severally, the right, the left, and the centre, accordingly as they represented supernaturalism, naturalism, or a mediating tendency. The first section was represented, among others, by G. A. Gabler, H. T. W. Hinrichs, and K. T. Göschel; the leftists, by Bruno Bauer, Feuerbach, Strauss, and K. L. Michelet; the centrists, represented by J. K. Rosenkranz, J. E. Erdmann; while W. Vatke, Weiss, I. H. von Fichte, the younger Ulrici, Fischer, and Carrière, were named pseudo-Hegelians, because, though retaining a large element of Hegel's doctrine, they did not follow closely the Hegelian tradition as represented by the three schools.

Hegel's philosophy has had great influence in other countries than Germany, notably on British and American thought. T. H. Green (q.v.), J. Caird, E. Caird, W. Wallace, J. H. Stirling, B. Bosanquet, F. H. Bradley, H. Jones, J. Watson, D. G. Ritchie, A. S. Pringle-Pattison, McTaggart, and Baillie in Great Britain, and G. S. Morris, W. T. Harris, J. Dewey, and J. Royce in the United States, have been more or less influenced by Hegel, although many of these thinkers have attacked Hegelianism. In Italy at the present time a modernized form of Hegelianism is advocated by B. Croce. In Germany the encouraging patronage extended by the Prussian government created in the later years of Hegel's life a great professorial constituency of Hegelians. But the metaphysical excesses of these Hegelians led to a violent reaction, the effects of which have lasted to the present day. For various views of his system, consult: Trendelenburg, *Logische Untersuchungen* (Berlin, 1840; 3d ed., 1870); Ulrici, *Ueber Princip und Methode der hegelschen Philosophie* (Halle, 1841); Janet, *Etudes sur la dialectique dans Platon et dans Hegel* (Paris, 1865); Harris, *Hegel's Logic* (Chicago, 1890); Caird, *Hegel* (London, 1883); Bosanquet, *Introduction to Hegel's Philosophy of Fine Art* (ib., 1886), containing also translations of selected portions of Hegel's writings on aesthetics; Morris, *Hegel's Philosophy of the State and of History* (Chicago, 1888); Seth (Pringle-Pattison), *Hegelianism and Personality* (2d ed., Edinburgh, 1893); McTaggart, *Studies in the Hegelian Dialectic* (Cambridge, 1896), *A Commentary on Hegel's Logic* (ib., 1910), and *Studies in Hegelian Cosmology* (ib., 1901); Noel, *La logique de Hegel* (Paris, 1895); Schmitt, *Das Geheimniss der hegelschen Dialektik* (Halle, 1888); Baillie, *Origin and Significance of Hegel's Logic* (London, 1901); Hibben, *Hegel's Logic* (New York, 1902); Mackintosh, *Hegel and Hegelianism* (ib., 1904); *Hegel's Religion-Philosophie, in gekürzter Form*, hrsg. von A. Dreuss (Jena, 1905); Cunningham, *Thought and Reality in Hegel's System* (New York, 1910); J. O. Knott, *Seekers after Soul* (Boston, 1911); the philosophical works of Rosenkranz and of K. L. Michelet; and the histories of modern philosophy by Ueberweg and Heinze, Fischer, Windelband,

Höffding, Erdmann, Weber, and Thilly. For his life, consult Rosenkranz, *Hegels Leben* (Berlin, 1844), and Haym, *Hegel und seine Zeit* (ib., 1857).

HEGEL, KARL VON (1813-1901). A German historian, elder son of the philosopher. He was born at Nuremberg, studied philosophy, theology, philology, and history at Berlin and Heidelberg, was assistant at the Kölnische Gymnasium in Berlin, became professor of history at Rostock (1841) and at Erlangen (1856). He was chief editor of *Chroniken der deutschen Städte vom 14. bis ins 16. Jahrhundert* (1862-99) and a member of the commission for the publication of the *Monumenta Germaniae historica*. His principal work is *Geschichte der Städteverfassung von Italien* (1847); and among his other works the more important are: *Die Chronik des Dino Compagni* (1875); *Ueber den historischen Wert der ältern Dante-Kommentare* (1878); *Briefe von und an G. W. F. Hegel* (1887); *Städte und Gilden der germanischen Völker im Mittelalter* (1891); *Die Entstehung des deutschen Stadtwesens* (1898); *Leben und Erinnerungen* (1900), an autobiography.

HEGELUND, hā'ge-lund, PEDER JENSØN (1542-1614). A Danish dramatist, born at Ribe. He studied at Copenhagen, Leipzig, and Wittenberg, was made rector of the school at Ribe (1568), dean of the cathedral, and Bishop of Ribe (1595). A number of his plays and an historical work are lost, but several of his poems, and a play, *Susanna og Calumnia*, adapted from Sixtus Bitulejus, which he arranged for pupils, and which was acted at Ribe (1570), have been edited by S. Birkit Smith (1888-90).

HEGESIAS (Lat., from Gk. Ἡγήσιος, *Hēgēsias*). A Cyrenaic philosopher, who flourished about 300 B.C. He was a hedonist (see **HEDONISM**) and a follower of Aristippus (q.v.), but taught that a life of pure pleasure was unattainable and therefore not to be sought. The chief aim of life was freedom from pain. Therefore it was the part of true wisdom to cultivate a state of absolute indifference to all pleasure. In his doctrine he set forth the desirability of suicide as a means of escaping the sorrows of this life so eloquently that Cicero tells us Ptolemy forbade his teaching as pernicious. From this advocacy of suicide he was given the nickname *πενθόβατος* (Death's advocate).

HEGESIAS OF MAGNESIA, IN LYDIA. A Greek rhetorician and historian, who flourished about 300 B.C., called by Strabo founder of the so-called Asiatic or florid style of Greek oratory. He wrote on the life of Alexander the Great, perhaps in an historical work, perhaps, rather, in an epideictic oration. Consult: Cicero, *Orator*, 67, 69, with Sandys's notes; Bury, *Ancient Greek Historians* (New York, 1909); Norden, *Die Antika Kunstprosa*, vol. i (2d ed., Leipzig, 1909).

HEGESIPPUS (Lat., from Gk. Ἡγήσιππος). A Christian writer of the second century. He was probably of Jewish descent and born in the East, whence he went to Rome, stopping at Corinth on the way. He is supposed to have died about 189. While at Rome he composed a work, *Hypomnemata*, in five books, which was probably directed against the Gnostics and may have been in some sense a history of the early Church. It is known only from fragments, mainly in Eusebius. Another work on the wars of the Jews (also in five books), ascribed to Hegesip-

pus, is confessedly spurious. The most complete collection of the fragments of his writings is that of Galland, *Bibliotheca*, vol. ii (Venice, 1765-81); they are also in Migne, *Patrol. Græca*, vol. v (Paris, 1854-66), and are translated in the *Ante-Nicene Fathers*, vol. viii (New York, 1890-97). Consult Zahn, *Forschungen zur Geschichte der Neue Testament Kanons* (Leipzig, 1900), and Harnack, *Chronologie der altchristliche Literatur* (ib., 1893).

HEGESIPPUS. An Athenian orator of the fourth century B.C., an ally of Demosthenes against Philip of Macedon. In 343 B.C. he was sent, with others, to negotiate with Philip for the return of the island Malonnesus, situate in the Ægean Sea, off the coast of Thessaly, which Philip had seized. The oration *De Malonneso*, ascribed to Demosthenes, probably is the work of Hegesippus. Consult Christ-Schmid, *Geschichte der griechischen Litteratur* (5th ed., vol. i, p. 556, Munich, 1908).

HEGESO, he-jē'sō, MONUMENT OF. One of the most beautiful of the monuments in the Street of Tombs at Athens. It belongs to the fourth century B.C. and is decorated with a relief representing a lady at her toilet with a female slave in attendance. Consult Weller, *Athens and its Monuments* (New York, 1913), and the Plate accompanying the article **GREEK ART**.

HEGIRA, hej'ī-rā. See **HEJIRA**.

HEGIUS, hā'gi-us, ALEXANDER (c.1433-98). A German humanist, teacher of Erasmus. He was born at Heek (whence his name) in Westphalia and was taught by Thomas à Kempis at Zwolle. In 1469 he taught at Wesel; in 1474 at Emmerich and at Deventer, where Erasmus, the future Pope Adrian VI, Conrad Goclenius, afterward professor at Louvain, and Hermann von dem Busche were among his pupils. His methods were novel; he did not use the mediæval textbooks, but made classic Latin his standard and tried to introduce Greek. His works, comprising treatises on pedagogy, morals, and psychology, together with hymns, elegies, and letters, and an essay, *De Utilitate Græcæ Linguae*, now very rare, were originally published by his pupil, Jakob Fabri, in 1503.

HEGNERBERG-DUX, hēg'nēn-bēr-k-dux', FRIEDRICH ADAM JUSTUS, COUNT (1810-72). A Bavarian statesman, descended from Georg Dux, a natural son of William IV of Bavaria. He was educated at Würzburg in law and medicine and in 1845 was elected to the Bavarian Lower House. He was a member of the National Assembly at Frankfurt and from 1848 to 1865 was President of the Bavarian House of Deputies. Always independent in politics, he was a leader of the opposition up to 1848, then for a short time was allied with the government, only to oppose it again because of its extreme conservatism. In 1871 he was made Prime Minister, but he died less than a year after.

HEGNER, hēng'nār', ANTON (1861-1915). A Danish violoncellist, born at Copenhagen. Immediately after graduation from the Copenhagen Conservatory he became solo cellist of the Copenhagen Philharmonic Orchestra. A concert tour of Germany in 1892 gained him international reputation. The success of his American tour of 1894 was such as to induce him to settle in New York for several years. He wrote two concertos and many solo pieces for his instrument, four string quartets, and a piano trio.

HEGNER, hēg'nēr, ULRICH (1759-1840). A Swiss author, born at Winterthur. He wrote:

Auch ich war in Paris (1803-04); *Berg-, Land- und Seereisen* (1818); *Die Molkenkur* (3d ed., 1827), a descriptive novel; its sequel, *Suschems Hochzeit* (1819); and *Salys Revolutionstage* (1814), an historical novel; also the biographical and critical works: *Hans Holbein, der jüngere* (1827) and *Beiträge zur nähern Kenntnis und wahren Darstellung J. K. Lavaters* (1836). The collected edition of his works in five volumes was published at Berlin (1828-30). Consult Schellenberg-Biedermann, *Erinnerungen an Ulrich Hegner* (Zurich, 1843), and Waser, *Ulrich Hegner* (Halle, 1901).

HEGOLEH, or **MADOQUA**. See **DUIKER**; **BENT ISRAEL**.

HEHN, hân, **VIKTOR** (1813-90). A German-Russian writer and teacher, born at Dorpat. He studied there (1830-33) and at Berlin (1838-40). After extended travels, especially in Italy, he became teacher of German at Parnau (1841) and afterward at the University at Dorpat. Here he fell under suspicion politically and, after a long consideration of his case, was by Czar Nicholas ordered to serve in an inferior position in the Province of Tula in the interior of Russia. But Alexander II summoned him to St. Petersburg and made him chief librarian of the Imperial library (1855). In 1860 and 1863 he traveled again in Italy and from 1874 on lived at Berlin as Russian Imperial Councillor. His works are: *Zur Charakteristik der Römer* (1843); *Zur Physiognomie der italienischen Landschaft* (1844); *Italien: Ansichten und Streiflichter* (6th ed., 1900); *Kulturpflanzen und Haustiere in ihrem Uebergang von Asien nach Griechenland und Italien sowie in das übrige Europa* (7th ed., by O. Schrader, 1902), the most important of his works and the most important work, especially in its method, on the subject; *Gedanken über Goethe* (4th ed., 1900); and, posthumously, *Helms Briefe an seinen Freund Wichmann* (1890); *De Moribus Ruthenorum: Zur Charakteristik der russischen Völksseele: Tagebuchblätter, 1857-73* (1892, ed. by Schiemann); *Ueber Goethes Hermann und Dorothea* (2d ed., 1898, ed. by Leitzmann and Schiemann); *Reisebilder aus Italien und Frankreich* (1894, ed. by Schiemann). For his *Life*, consult Schrader (Berlin, 1891) and Schiemann (Stuttgart, 1894).

HEIBA, hâ'ba, **EL**. A Moroccan pretender in 1912-13. He gained some temporary successes after the abdication of the Sultan, Mulai Hafid. See *Morocco, History*.

HEIBERG, hê'berg, **AXEL** (1848-). A Norwegian publicist, born and educated at Christiania. In 1871-73 he was Vice Consul at Shanghai, and later he entered into extensive industrial enterprises at home. He first became prominent through the financial help he gave to the development of sport in Norway. Later he became known as a patron of Norwegian science, art, and culture. With Th. Fearnley and Ellef Ringnes he contributed large sums to Nansen's Polar expedition in the *Fram* and to the Otto Sverdrup Polar expedition. In 1896 he led in the establishment of Nansen's Fund for the Advancement of Science by giving 60,000 kroner to it. To the National Theatre at Christiania he gave statues of Ibsen and Björnson. But probably his greatest importance is due to his energetic work for the reforestation of Norway. He formed (1898) *Det norske Skogsekskab*, to which he gave much in money and time. His extensive estate at Strand,

Numedal, he developed as a model farm. Heiberg came to be known as one of Norway's most prominent publicists in the early twentieth century.

HEIBERG, **GUNNAR EDVARD RODE** (1857-). A Norwegian dramatist, born at Christiania and educated there and outside of Norway. His first two poems, *Mennekets Genesis* and *En soirée dansante* (1878), did not attract notice; but his first drama, *Tante Ulrikke* (1884), showed that a new power had entered literature. From 1884 to 1888 he was successful as director of Bergen's Theatre. His drama *Kong Midas* (1890) caused a sensation throughout Scandinavia because of its attack on Björnson. Refused at the Christiania Theatre, it was acted throughout the North, with Heiberg's wife in a leading part. Psychologically more important were the comedies *Kunstnere* (1893) and *Balkonen* (1894), the latter of which, as a piece of dramatic art, is one of the most remarkable in Norwegian literature, but its lack of respect for morals aroused great indignation. There followed the social drama *Det store Lød* (1895), and the comedies *Folkeraadet* (1897), chastising the politicians, *Harald Svans Mor* (1899), and *Kjærlighed til Næsten* (1902). Measuring fully up to his best works is *Kjærlighedens Tragedie* (1904), a melancholy consideration of the lot of man as ruled by the unconquerable powers of Nature. His later dramas include *Jeg vill værge mit Land* (1912) and *Parade-Sengen* (1913). Consult C. Collin, *Kunsten og Moralen* (1894), and C. Nærup, *Litteraturhistorie* (1890-1904).

HEIBERG, hî'bêrk, **HERMANN** (1840-1910). A German novelist, born in Schleswig and educated there. He succeeded his father in his publishing house, sold it in 1870, and went to Berlin, where he was business manager of the *Norddeutsche Allgemeine Zeitung* and of the *Spencersche Zeitung*, and, after a few years as a banker, devoted himself to literature. His novels are modern and realistic, successful in painting German provincial but not cosmopolitan life; among the nearly threescore titles the following may be mentioned: *Plaudereien mit der Herzogin von Seeland* (1881); *Acht Novellen* (2d ed., 1895); *Apotheker Heinrich* (2d ed., 1890)—these three said to be his best; *Eine vornehme Frau* (2d ed., 1889); *Esthers Ehe* (2d ed., 1890); *Menschen untereinander* (2d ed., 1896); *Höchste Liebe schweigt!* (2d ed., 1894); *Zwischen drei Feuern* (1895); *Merkur und Amor* (1898); *Vieles um Eine* (1900); *Dreissig Geschichten* (1901); *Zwei Frauen* (1901); *Heimat* (1902); *Die schwarze Marit* (1903). His collected works appeared in 18 volumes (1894-96).

HEIBERG, **JOHANN LUDVIG** (1791-1860). A Danish poet and critic, born in Copenhagen. He was the son of Peter Andreas Heiberg and of a famous novelist who later became Baroness Gyllembourg-Ehrensvärd (q.v.). The father was exiled for political reasons in 1800, and the mother cared for the son till he entered the University of Copenhagen in 1809. He spent four years in study and travel and in 1813 wrote at Stockholm "*Hjemkomsten*" (The Return Home), a poem of much strength. This was followed by a drama, *The Theatre for Marionettes* (1813), and other works that brought Heiberg (1817) a grant from the government for travel. He passed 1819-22 at Paris with his exiled father. For three years he was pro-

fessor of Danish at Kiel and lectured on the comparative merits of the Eddas and Oehlenschläger (Ger. trans., 1827). In 1825 he returned to Copenhagen and devoted himself to the task, in which he was only partially successful, of gaining a footing for the Hegelian philosophy. During this period he produced in rapid succession national dramas, comedies, vaudeville, and farces, while editing the Copenhagen *Flying Post*, and writing also poems collected in 1841, two of which, "A Soul after Death" and "The Newly Wedded," have taken a high place in Danish literature. Much of all this work was satirical, and Heiberg grew increasingly unpopular, especially for a malicious dramatic skit, *The Nut-Cracker* (1845). Yet in spite of this he was made director of the National Theatre in 1849, a post from which he was forced by intrigue in 1856, after which he was made theatrical censor. He died in Paris. Heiberg's *Works* are in 22 volumes (Copenhagen, 1861-62).

HEIBERG, PETER ANDREAS (1758-1841). A Danish dramatist and satirist, born at Vordingborg on the island of Zealand. From 1788 he was active at Copenhagen as an official translator, and, with Malte-Brun (q.v.), as an exponent of liberal ideas and a scathing critic of the Danish government. In 1799 he was accused of a series of offenses against a newly enacted press law and was banished. He went to France, was there appointed by Napoleon to a post in the Ministry of Foreign Affairs, and obtained a pension from Louis XVIII. In his *Rigsdalersedlens Hændelser* (Adventures of a Bank-Note, 2 vols., 1787), and more particularly in his operettas and comedies, he unsparingly satirized the existing régime for its obscurantist tendencies and its unfairness. As a dramatist, he was perhaps second to Holberg (q.v.) in influence, but was greatly inferior to him in merit. One of his comedies appeared in an English rendering, by C. H. Wilson, as *Poverty and Wealth* (London, 1799). He further wrote political treatises in Danish and French. Consult the study, by Schwanenflügel (Copenhagen, 1891); also Heiberg's own *Erindringer af min politiske og literaire Vandel i Frankrige* (Christiania, 1830), and Longfellow, *The Poets and Poetry of Europe* (New York, 1855). His complete works appeared in four volumes (1806-19).

HEIBERG (hí'bérk) **LAND**. An Arctic island to the west of Grinnell Land, being the largest of the four islands forming the archipelago discovered in 1900 by the Norwegian explorer Sverdrup (Map: Arctic Regions, E 6). The other islands are called Amand Ringnes, Ellef Ringnes, and King Christian. They are all ice-clad and uninhabited. Their discovery filled in the extended gap between Grinnell Land and the Parry Islands. Heiberg Land is separated from Grinnell Land by Greely Fiord, Nansen and Eureka sounds. Its southern limit is in 78° N., and its northern is in about 81° 31' N. The peninsula Svartenhuk was renamed by Peary in 1906 Cape Thomas Hubbard, by which designation it is usually known. Consult Sverdrup, *New Land: Four Years in the Arctic Regions* (2 vols., New York, 1904).

HEIDEGGER, hí'dég-ér, JOHANN HEINRICH (1833-98). A Swiss theologian, born at Birentschweil in the Canton of Zürich. He was a student at Marburg and Heidelberg and afterward returned to the latter town as professor of Hebrew and then of philosophy. In 1865 he was

made professor of moral philosophy at Zürich. An ardent reformer and expert controversialist, he was the author, with Turretin, of the *Formula Consensus Helvetica* (1675), the object of which was to effect a league of the Reformed churches. This plan, however, failed. He was the author of a number of other works of little interest now, mostly directed against the Catholic church, and including *Anatome Concilii Tridentini* (2 vols., 1672) and a *Historia Papalus* (1684), published under the pseudonym "Nicanter von Hohenegg."

HEIDELBERG, hí'dél-bérk. A city of Germany, formerly capital of the Palatinate, situated in the northern part of Baden, on the left bank of the Neckar, 12 miles southeast of Mannheim and 55 miles south of Frankfurt (Map: Germany, C 4). It is renowned for its romantic picturesqueness and historic environs. The old town lies on a beautiful slope between the castle hill and the river. It consists mainly of one street (Hauptstrasse), about 1½ miles long, and is architecturally very interesting. The newer portion of Heidelberg extends westward. The interesting Rathaus was built in 1704. Among the ecclesiastical edifices the most prominent are the late Gothic Heilige Geist Kirche, of the fifteenth century, erected under the Emperor Rupert, whose tomb it holds, and the Protestant church of St. Peter, restored in the ornate Gothic style in 1807.

Besides the famous university (see HEIDELBERG, UNIVERSITY or), the city is celebrated for its castle, one of the most interesting in Europe, known as the "German Alhambra," now largely a ruin. It overlooks the town on the east and is surrounded by a splendid park. It was probably founded by Conrad of Hohenstaufen in the twelfth century and was enlarged at various times by the rulers of the Palatinate, the palatial portions dating from the sixteenth century and the earlier part of the seventeenth. The castle was well-nigh destroyed in the desolating wars waged by Louis XIV towards the close of the seventeenth century. It was largely rebuilt, then ruined by lightning in 1764 and left in its present condition. This ivy-clad, moated castle, reached by a bridge, and rising with careless grandeur in the midst of beautiful trees and foliage, consists of a number of buildings constructed at different periods. The yard is faced by the highly decorated façades of the castle's two finest buildings—the Friedrichs-Bau and the Otto-Heinrichs-Bau. The former is a grandiose, late Renaissance building, dating from 1601 and renovated in 1897-1903. The latter, dating from 1556, with a striking portal, is a rare example of German Renaissance, its front being lavishly covered with medallions and with symbolical statues, both biblical and pagan. There are vast princely halls, the great watch tower, a beautiful balcony, dungeons, cellars, one containing the well-known Heidelberg tun (q.v.), the museum with pictures and historic relics, and a magnificent terrace which commands a splendid view. On the terrace is a statue of Victor von Scheffel, unveiled in 1891.

The environs of Heidelberg abound in ancient, often prehistoric, ruins, foundations, ring walls, and cisterns, and are rich in legendary and literary associations. Among the conspicuous objects of interest are the Molkenkur, a lovely hill whose top commands a view of the castle from above; the Heiligenberg, the Mons Piri of the Romans; the old and new bridges over the

Neckar; the Philosophenweg, a long, charming walk through vine-clad slopes, with views reaching to the distant Speyer Cathedral and the Hardt Mountains; and the famous students' inn and dueling grounds in the vale of the Hirschgasse. The University Library, erected in modern Renaissance style in 1905, contains 500,000 bound volumes and over 4000 papyri.

The educational institutions of Heidelberg comprise, besides the university, one Gymnasium, an Oberreal, a high school for girls, continuation schools (trade, commercial, and general), and seven private schools. The public grammar schools had 5979 pupils in 1910-11. The trade schools had 1412 pupils in 1912-13. There are also a museum and a number of scientific and art societies. The manufactured products include cement, artificial wood, scientific instruments, fire-department apparatus, etc. There is considerable trade in the hops, tobacco, fruits, and nuts grown in the vicinity. The town is equipped with electric railways both for local and interurban traffic, and a mountain railway connects the city with the Molkenkur. These lines, owned in part by the city, carried 7,817,000 passengers in 1912. The city owns property valued at 25,700,000 marks and has a municipal debt of 22,900,000 marks. The population was 40,121 in 1900 and 56,016 in 1910, including 34,212 Protestants. Of the total population, 26,528 were male and 29,488 female. The number of foreign residents, many of whom were English and American students in the university, was 1779 in 1910.

Heidelberg stands on the site of a Roman colony, but the town dates only from the latter part of the Middle Ages. From the thirteenth century, when it was an insignificant place, down to 1720 it was the capital of the Palatinate. After the Reformation Heidelberg was long the headquarters of German Calvinism and gave its name to a famous Calvinistic catechism. The town suffered much during the Thirty Years' War. Tilly captured and plundered it in 1622. It was severely treated by the French in 1688 and was in 1693 almost totally destroyed by them. It passed to Baden in 1803. Consult Oncken, *Stadt, Schloss und Hochschule Heidelberg* (Heidelberg, 1885), and E. Godfrey, *Heidelberg: Its Princes and its Palaces* (New York, 1906).

HEIDELBERG, UNIVERSITY OF. The oldest of the German universities within the present German Empire, founded in 1386 by Rupert I, Elector Palatine. The first rector and the real organizer was Marsilius von Inghen, who modeled the university after that in Paris, where he had been a lecturer. The organization was ecclesiastical, the mode of teaching scholastic. From the beginning the university was well attended and successful. In the middle of the sixteenth century Melancthon gave his aid to a complete reorganization; scholasticism gave way to humanism, and from being Catholic the university became Protestant and a stronghold of Calvinism. At this time the staff included Ursinus and Olevianus, the authors of the Heidelberg Catechism, published in 1563. A period of great prosperity followed, lasting till 1622, when Tilly captured the town and sent to Rome the famous collection of manuscripts known as the Bibliotheca Palatina. The university was much crippled and in 1626 suspended altogether. In 1652 it was restored, and religious tests for teachers were removed. In the French wars at

the end of the century, however, the town again suffered, and the university was again broken up. Some of the professors, it is true, set up instruction at Frankfurt-on-the-Main in 1694, removed to Weinheim in 1698, and two years later returned to Heidelberg once more; yet for a century the university led a dead-and-alive existence under the influence of Catholic reactionaries, and after the Peace of Lunéville (1801) nearly all its possessions and endowments were lost. When Heidelberg became a part of Baden in 1803, its new sovereign restored the foundation, and it has since in a measure recovered its former fame. In 1886 the five-hundredth anniversary was celebrated. There were 2264 students in the winter half year 1912-13, the largest number in any one faculty being in medicine. The number of teachers and professors was 163. The library has about 500,000 volumes, including incunabula, and 4000 manuscripts. Consult: Hautz, *Geschichte der Universität Heidelberg* (Mannheim, 1862-64); Georg Weber, *Heidelberger Erinnerungen* (Stuttgart, 1886); H. Buhl, *Zur Geschichte der Universität Heidelberg* (Heidelberg, 1902).

HEIDELBERG CATECHISM. See CATECHISM.

HEIDELBERG JAW. See MAN, SCIENCE OF, *Ancient Types*.

HEIDELBERG TUN. An enormous wooden cask in the cellar beneath Heidelberg Castle, set up in 1751 by the Elector Charles Philip. It has a capacity of 49,000 gallons and measures 36 × 24 feet. Until 1769 it was constantly kept full of Rhine wine, but the custom was abandoned in that year.

HEIDELBERG UNIVERSITY. A co-educational institution, situated at Tiffin, Ohio. It was incorporated as a college in 1851 and reorganized as Heidelberg University in 1890. Its endowment in 1914 was \$360,000, its income \$40,000, and the approximate value of its buildings and grounds \$400,000. In the same year its faculty numbered 36, and its student body 484, of whom 192 were enrolled in the collegiate department. Its departments include summer and preparatory schools, and schools of music, art, oratory, commerce, and liberal arts. The first building on the campus was completed in the spring of 1853. Other buildings include University Hall, Sarah Keller Cottage, the Library, Science Hall, and Rickly Chapel. The degrees of A.B., B.S., P.B., and B.L. are given. The library contains about 20,000 volumes. The president in 1914 was Rev. Charles Ervine Miller, D.D., LL.D.

HEIDELOFF, hî'de-lof, KARL ALEXANDER VON (1788-1865). A German architect and painter, born at Stuttgart. He studied in Stuttgart and in 1818 was appointed city architect at Nuremberg. His knowledge of the early Gothic made him particularly successful in restorations; examples of this type of work are the churches of St. Sebald and St. Lawrence, and Albert Dürer's fountain—all in Nuremberg. From 1822 to 1854 he was a professor in the polytechnic school and conservator of the monuments of art in the same city. He was an historical painter of some note, and the author of several important works on architecture, among which are: *Die Lehre von den Säulenordnungen* (1827); *Der Kleine Vignola* (1832); *Nurnbergs Baudenkmale der Vorzeit* (1838-43; complete ed., 1854); *Die Ornamentik des Mittelalters* (1838-42); *Die Kunst des Mittelalters in*

Schwaben; Baudenkmale aus Schwaben (1854-61).

HEIDEN, hī'den, EDUARD (1835-88). A German agricultural chemist, born and educated at Greifswald. He went to Eldena in 1855 and became assistant in the chemical laboratory of the academy there in 1857. He was professor of agricultural chemistry at Waldau (1862-67) and at Berlin (1867), in 1868 was appointed to the superintendency of the experimental station at Pommritz, and in 1871 became a professor at the latter station. He wrote: *Die Phosphorsäure* (1864); *Lehrbuch der Düngerlehre* (1867-68; 2d ed., 1879-87; a third volume, *Statik des Landbaues*, 1871); *Die landwirtschaftlichen Versuchsstationen* (2d ed., 1874); *Leitfaden der gesamten Düngerlehre und Statik des Landbaues* (3d ed., 1892); *Ueber die zweckmässigste Ernährung des Schweins* (1879); and, with Müller and Langsdorff, *Die Verwertung der städtischen Fäkalien* (1885).

HEIDENHAIN, hī'den-hīn, RUDOLF PETER HEINRICH (1834-97). A German physiologist, born at Marienwerder and educated at Königsberg, Halle, and Berlin. He spent several years in experimental research with Du Bois-Reymond and became docent at Halle (1857) and professor at Breslau (1859). Besides many contributions to the foremost German technical journals of histology, anatomy, and physiology, he published: *Physiologische Studien* (1856); *Mechanische Leistung, Wärmeentwicklung und Stoffumsatz bei der Muskelthätigkeit* (1864); *Der sogenannte tierische Magnetismus* (1880); *Die Vivisektion im Dienste der Heilkunde* (1879; 2d ed., 1884); *Die Vivisektion* (1884); *Beiträge zur Histologie und Physiologie der Dünndarmschleimhaut* (1888). Consult Grützner, *Zum Andenken an Rudolf Heidenhain* (Bonn, 1899).

HEIDENHEIM, hī'den-hīm. A town of Württemberg, Germany, situated on the Brenz, a short distance from the Bavarian frontier (Map: Germany, D 4). It has a Latin school, a college for textile workers, and a number of large manufactories of textiles, machinery, cigars, dyestuffs, binding materials, and beer. Pop., 1900, 10,510; 1910, 17,780.

HEIDENMAUER, hī'den-mou'ér (Ger., heathen wall). 1. A name given in Germany to the remains of various prehistoric fortifications of German and Roman origin. Such ramparts are found on the Ottilienberg, a hill of the Vosges in Lower Alsace, and on the Kastanienberg near Dürkheim in the Palatinate. 2. A novel by James Fenimore Cooper (1832). The scene is laid in the Vosges during the Middle Ages.

HEIDENSTAM, hī'den-stām, (KARL GUSTAF) WERNER VON (1859-). A Swedish litterateur, born at Olshammar (Nerike Province). He studied painting at the Stockholm Academy and traveled extensively, but later turned to literature; took prominent rank among contemporary Swedish lyrists by his collections, *Vallfart och Vandringar* (1888) and *Dikter* (1895); and wrote further, among various works, the volumes of prose sketches, *Från Col di Tenda till Blocksberg* (1888) and *Saint Göran och draken* (1900; in a German rendering, 1902); the fantastic romance *Hans Alienus* (1892); the viking novel *Folkungaträdet* (1905); *Dagar och händelser* (1909); *Svenskarna och deras hövdingar* (1909); *Proletarfilosofiens upplösning och fall* (1911); *Stridskrifter* (1912).

HEIGEL, hī'gel, KARL AUGUST VON (1835-1905). A German poet belonging to the Munich school, born in Munich and educated at the university there. After traveling somewhat, he settled in Berlin, where he was literary editor of the *Bazar* from 1865 to 1875. From 1875 on he lived a wandering life in Munich, the Tirol, and Italy, occupying himself with literary work under the patronage of Louis II of Bavaria. His principal works are: the epic *Bar Cochba, der letzte Judenkönig* (1857); the dramas *Marfa* (1876), *Freunde* (1880), *Die Zarin* (1898), *Josephine Bonaparte* (1882); the stories *Novellen* (1866), *Neue Novellen* (1872), and *Neueste Novellen* (1878)—all three collections—*Es regnet: Eine Münchner Geschichte* (1878), *Am blauen Gardasee* (1899); the novels *Ohne Gewissen* (1871), *Die Dame ohne Herz* (1873), *Der Teufelskudel* (1878), *Das Geheimnis des Königs* (1891), *Der Volksfreund* (1896), *Die neuen Heiligen* (1901), *Brömmels Glück und Ende* (1902); and the biographies *Karl Stieler* (1890) and *König Ludwig II. von Bayern* (1892).

HEIGEL, KARL THEODOR VON (1842-1915). A German historian, brother of Karl August von Heigel. He was educated at Munich, his native city; became instructor in history (1873), member of the Academy (1876), assistant professor in the university (1879), in 1885 professor, and in 1904 president of the Academy. His works include: *Das Herzogtum Bayern zur Zeit Heinrichs des Löwen und Ottos von Wittelsbach* (1867), with Riezler; *Ludwig I, König von Bayern* (1872); *Der österreichische Erbfolgestreit* (1877); *Quellen und Abhandlungen zur neuern Geschichte Bayerns* (1890); *Nymphenburg* (1891); *Deutsche Geschichte vom Tode Friedrichs des Grossen bis zur Auflösung des alten Reichs* (1899-1911); *Biographische und kulturgeschichtliche Essays* (1906); *Politische Hauptströmungen in Europa im 19. Jahrhundert* (1906); *Die Münchner Akademie 1759-1909* (1909); *Zwölf Charakterbilder aus der neuen Geschichte* (1913).

HEIGHTS, MEASUREMENT OF. See LEVELING; HYPSOMETRY.

HEIHACHIRO, Togo. See Togo HEIHACHIRO.

HEIJERMANS, hī'yér-māns, HERMAN (1864-). A Dutch playwright, born at Rotterdam, Holland. He attracted attention by his sketches of Jewish family life, published in the Amsterdam *Handelsblad* under the pen name "Samuel Falkland." His works of fiction include: *Trinette* (1892); *Fles* (1893); *Kamertjeszonde* (2 vols., 1896); *Intérieurs* (1897); *Diamantstadt* (2 vols., 1903); *Die Augen, oder Jobs wundersame Erlebnisse* (1910). His plays include: *Dora Kremer* (1893); *Ghetto* (1898, 1905); *Het zevende Gebot* (1899, 1906); *Op Hooft van Zegen* (1900), which was played in Paris and was translated into English under the title *The Good Hope*; *Het Pantser* (1901, 1904); *Ora et Labora* (1901, 1904); *Wonne-mond* (1904); *Ahasver* (1906); *Allerseelen* (1906); *Seltzame Jagd* (1909); *Dornröschens Erwachen* (1909).

HEIJN, PRIT. See HEYN, PRIT.

HEI-KU-TAI, BATTLE OF. See RUSSO-JAPANESE WAR.

HEILBRONN, hīl-brōn'. A manufacturing town of Württemberg, Germany, situated on the Neckar (here navigable), 33 miles by rail north-east of Stuttgart (Map: Germany, C 4). The old section of Heilbronn is surrounded by a fine

avenue laid out on the site of the ancient fortifications. In keeping with the mediæval character of the town are the interesting Gothic church of St. Kilian, of the fifteenth century (restored), with a finely carved altar and beautiful windows; the late Gothic Rathaus of the sixteenth century, with a remarkable clock, and associated intimately with the history of Götz von Berlichingen, as is also the Götzenturm, where he was imprisoned; the administration building, originally an Imperial palace and afterward occupied by the Teutonic Order; and the Schönthaler Hof, where Charles V once sojourned for the sake of the Heilbronn waters. Memorials and statues to famous Germans are numerous. Schiller lived in Heilbronn for a time, and his house is shown. There are an historical museum, a theatre, interesting archives (among which are letters from Gustavus Adolphus, Charles XII, Schiller, and others), a Gymnasium founded at the beginning of the seventeenth century, a splendid post office, schools of music, of trade, and of agriculture, and a meteorological observatory. The town is lighted by municipal gas and electricity.

Heilbronn produces chemicals, silverware, machinery, sugar, cigars, iron and metal ware, glue, fertilizer, paper, conserves, envelopes, cutlery, cologne, pianos, soap, cement, white lead, vinegar, leather, soda, chicory, coffee, and beer. In the vicinity are situated extensive salt works and numerous vineyards. The town has four harbors and a large trade in groceries, agricultural products, wood, and coal. The magnificent views in the vicinity embrace the mountains of middle Germany, the Black Forest, and the Vosges. Heilbronn is first mentioned in 741 under the Carolingians. It became a town in 1225 and a free city in 1360 and suffered greatly from war through the Middle Ages. Here, in 1633, in the course of the Thirty Years' War, a treaty of alliance was concluded between the German Protestant states and Sweden. Heilbronn came into the possession of Württemberg in 1802. Pop., 1900, 37,891; 1910, 42,709, mostly Protestants.

HEILBUTH, hîl'boot, FERDINAND (1826-89). A French genre painter, born at Hamburg. He studied at the Düsseldorf Academy, at Rome, and, under Gleyre, at Paris, where he became identified with the French school. His pictures are charming in color and full of humor and grace. The best include: "Excavations at Rome" and "The Cardinal," Wallace collection, London; "Palestrina's Rehearsal" (1857); "Luca Signorelli by the Body of his Slain Son" (1859), Hamburg Gallery; "Mont de Piété" (1861), Luxembourg; "On Monte Pincio," Corcoran Gallery, Washington; besides examples in several French provincial museums. He also painted portraits. In 1881 he received the cross of the Legion of Honor.

HEIL DIR IM SIEGERKRANZ, hîl dër îm zê'gër-krân'ts (Ger., Hail to Thee with Victor's Crown). The Prussian national hymn, the original words for which were written by Heinrich Harries. They were published in the *Flensburger Wochenblatt* of Jan. 27, 1790, as "A Song for the Danish Subject to Sing on his King's Birthday," to the melody of the English national hymn, "God Save Great George, the King." In 1793 B. G. Schumacher published a revised version in five stanzas which soon became the national hymn.

HEILPRIN, hîl'prin, ANGELO (1853-1907).

An American naturalist and traveler, son of Michael Heilprin. He was born at Satoralja-Ujhely, Hungary, and came to the United States in 1856. In 1870-78 he studied at the Royal School of Mines, London, at Geneva, and at the Imperial Geological Institution of Vienna. He was professor of invertebrate paleontology and geology at the Academy of Natural Sciences, Philadelphia (1884-1900), executive curator of that institution from 1883 to 1892, and the first president of the Geographical Society of Philadelphia. In 1886 he went to Florida and determined the geological structure of the peninsula. In 1888 he investigated the structure of the Bermuda Islands, and in 1890 made a journey to Mexico, in the course of which he ascended Orizaba, Popocatepetl, and Iztaccihuatl, making new barometric measurements of their altitude. In 1892 Heilprin led the Peary relief expedition to Greenland. After the destruction of Saint-Pierre, Martinique, by the eruption of Mont Pelée, in 1902, he made two journeys to the island and climbed to the crater while the volcano was in eruption. Recording this remarkable performance, he wrote *Mount Pelée and the Tragedy of Martinique* (1903) and *The Tower of Pelée* (1905). His other publications include: *Contributions to the Tertiary Geology and Paleontology of the United States* (1884); *The Geographical and Geological Distribution of Animals* (1887); *The Geological Evidences of Evolution* (1888); *The Bermuda Islands* (1889); *Principles of Geology* (1890); *The Arctic Problem* (1893); *The Earth and its Story* (1896); *Alaska and the Klondike* (1899). He edited, with his brother, Louis Heilprin, *Lippincott's New Gazetteer* (1905) and contributed to the *NEW INTERNATIONAL ENCYCLOPEDIA*.

HEILPRIN, LOUIS (1851-1912). An American scholar and encyclopædist, brother of Angelo Heilprin. He was born in Hungary. He was connected with the *NEW INTERNATIONAL ENCYCLOPEDIA*, and was the author of the *Historical Reference Book* (1884; 6th ed., 1899). He was joint editor with his brother of *Lippincott's New Gazetteer* (1905).

HEILPRIN, MICHAEL (1823-88). A biblical scholar, critic, and writer. He was born at Piotrkow, Russian Poland, of Jewish parents. He belonged to a family whose members were distinguished in the field of Hebrew lore as far back as the sixteenth century. His father, Phineas Mendel Heilprin, a Hebrew scholar of note, left Poland with his family in 1842, in consequence of the oppressive measures of the Russian government, and settled in Hungary. On the outbreak of the Hungarian revolution of 1848, Michael Heilprin threw himself ardently into the movement for national independence headed by Kossuth, whose friend he became. He published stirring war songs in the Magyar language, of which he had made himself master, and was appointed secretary of the literary bureau attached to the Ministry of the Interior under Szemere. After the collapse of the revolution Heilprin lived for less than a year in France, returned in 1850 to Hungary, and in 1856 went to England and shortly after to America. He was connected with the *New American Cyclopædia* from 1858 and was one of the associate editors of the new edition of that publication (1873-76). On the establishment of the *New York Nation*, in 1865, he became one of the regular contributors, his articles embracing a wide range in current European

history and literary criticism. In 1879-80 he published two volumes of *The Historical Poetry of the Ancient Hebrews, Translated and Critically Examined*, a work of profound original research, which at once took a position both in America and Europe as a most valuable contribution to advanced biblical criticism. The work was left incomplete at the author's death. Heilprin devoted the last years of his life, from 1881, in great measure to furthering Russian-Jewish agricultural colonization in the United States. He was a scholar of encyclopædic knowledge and was familiar with more than a dozen languages.

HEILSBRONN, hils-brön'. A small town in Middle Franconia, Bavaria, 20 miles from Nuremberg. Its chief industry is the handling of forest products and grain. The Cistercian abbey of Heilsbronn, the burial place of the Hohenzollern burgraves of Nuremberg, of the first Hohenzollern electors of Brandenburg, and of a number of Franconian princes of the house, owed its origin, in 1132, to Bishop Otto of Bamberg. The church contains monuments commemorative of ancient German history, a carved wood altar, and paintings by Dürer and other mediæval artists. Pop., 1900, 1208; 1910, 1366.

HEIM, hëym, or **HEIMR**, hëymr (Icel., home). In Norse mythology nine worlds are named: Muspelheim, Asaheim, Ljosalfaheim, Vanaheim, Mannaheim, Jötunheim, Svartalfaheim, Helheim, and Niflheim. The highest is Muspelheim (world of fire), the home of Surt, in the highest region of which was Gimli (heaven). The lowest is Niflheim (mist world), the home of cold and darkness, having in its midst the fountain Hvergelmer, where the dragon Nidhogg dwells. Midway between Muspelheim and Niflheim is Mannaheim (man's world), the round plane of the earth surrounded by the ocean. Above Mannaheim is Asaheim (world of the gods), forming an immense vault above the earth. In the midst of this is Idavold, the place where the gods assemble. Beyond the ocean is Jötunheim (home of giants), separated from Asaheim by the river Ifing, which never freezes over. Next above the earth is Ljosalfaheim (home of the elves of light), and between it and Asaheim is Vanaheim (home of the vans). Farther down is Svartalfaheim (world of dark elves); farther still Mannaheim and lastly Helheim (world of the dead, or *hel*).

HEIM, him, ALBERT (1849-). A Swiss geologist, born at Zurich, where he was educated and, after further study at Berlin, was made docent, and in 1873 professor, in the Polytechnic Institute. In 1875 he became also professor in the university. In 1881 he was appointed director of the department of natural sciences in the Polytechnic and head of the geological museum. He traveled to New Zealand in 1901, and in 1911 he retired. In 1904 the Wollaston medal of the London Geological Society was awarded him. His contributions to the study of mountain folding and glaciers, although largely based on observations in the Swiss Alps, have had a very broad influence upon research in these fields, both in Europe and in America. Heim wrote: *Untersuchungen über den Mechanismus der Gebirgsbildung* (1878); *Handbuch der Gletscherkunde* (1885); *Beiträge zur geologischen Karte der Schweiz* (1890); *Geologische Excursion quer durch die östlichen Schweizer Alpen* (1894); *Das Süntisgebirge untersucht und dargestellt* (1905); *Luft-Farben* (1912). He also pub-

lished a *Geologische Karte der Schweiz* (1894), with Schmidt, as well as several panoramic views and reliefs of Switzerland.

HEIMBURG, him'burk, GREGOR VON (c.1400-72). A German jurist and diplomat, born at Würzburg. He is ranked as one of the most brilliant men of his time. About 1430 he became secretary to Æneas Silvius, afterward Pope Pius II, and accompanied him to the Council of Basel; but they soon quarreled because of Heimburg's opposition to the papal policy of interference in German affairs, and the young man became syndic of Nuremberg and took a great part in the declaration of the neutrality of the German church in the quarrel between the Council and Pope Eugene IV (1438). He was a member of the commission demanding from the Pope the reinstatement of the electors of Cologne, Mainz, and Treves (1446), and as Minister of Duke Sigismund of Austria opposed the Pope and was put under the ban. Eventually Sigismund made his peace with the Pope, and Heimburg left his service for that of the Hussite King, George Podiebrad, of Bohemia. The latter died in 1471, and his Minister went to the court of the Duke of Saxony, where he died in the following year, only a few months after Pope Sixtus IV had removed the excommunication against him. His collected works, showing well the polemic character of the man, were published at Frankfurt in 1608. Consult: Pfizer's poem, *Der Welsche und der Deutsche* (Stuttgart, 1844); Brockhaus, *Gregor von Heimburg* (Leipzig, 1861); Joachimson, *Gregor von Heimburg* (Munich, 1891).

HEIMBURG, WILHELMINIE. See BEIRENS, BERTA.

HEIMCHEN AM HERD, DAS. See CRICKET ON THE HEARTH.

HEIMDAL, häm'däl, or **HEIMDALR**, häm'däl-ër (Icel.). In Norse mythology, Odin, whose mother was of the Jötun race, often said to be the son of nine virgin sisters. He is the guardian of Asgard, for which position he is peculiarly fitted; for he can see as well by night as by day, requires as little sleep as the birds, and can hear the grass grow. Before the last conflict he will rouse the gods by blowing on his horn Gjallarhorn. He and Loki, who are natural enemies, will then kill each other.

HEIMSKRINGLA, hims'kring'lä (Icel., world circle). One of the most important works in early Norse literature, being a history of the Norse kings from the earliest times down to his own day, by Snorri Sturluson (q.v.). There is an English translation by Laing, in three volumes, published first in 1844 and by the Norroena Society in 1906.

HEINE, hi'ne, HEINRICH (1797-1856). The greatest lyric poet, next to Goethe, of modern Germany, born in Düsseldorf, Dec. 13, 1797. He was called by himself the last of the Romantics, and by Matthew Arnold the continuator of Goethe, and was one of the few writers of primary importance in German literature after Goethe's death. "Your grandfather," he says he was told, "was a little Jew and had a big beard." This grandfather had shrewd sons, for all of them won a competence, and Heine's uncle Salomon became one of the wealthiest bankers of Hamburg. His father had but small part in his life. His mother (named Von Geldern), to whom he showed a constant devotion till his death, gave to his fantastic and romantic na-

ture a joy of life and a spirit of naturalism that make him akin to Goethe. He was a precocious boy, educated in a desultory way by Roman Catholic monks and French "philosophes," with the result that he became a skeptic before he had any faith to lose. He seems to have suffered little from race prejudice in youth, and for that he was grateful to France and to Napoleon, for whom he retained a kind of hero worship, and so had little sympathy with the War of Liberation (1813-14), that "contracted the heart so that men learned to hate what was foreign and in ceasing to be citizens of the world became only narrowly German."

While preparing himself to become a merchant and learning English, French, and Italian, he began to write poetry under the inspiration of a child love for "Veronica," probably also the "Reseda" of early poems. He conceived a passing affection, too, for an executioner's daughter, Josepha, the subject of several poems, of his "Dream Pictures," and of the most exquisite passage in his memoirs. She was, he says, his "love's purgatory" before he fell into love's hell in his unrequited affection for his cousin Amalie at Hamburg, whither he went in 1816. He tried to set up a business there in 1818, but he liked neither the business nor the city. For Amalie, under the names Otilie, Maria, Clara, Evelina, Agnes, Juliana, he voiced his passion in many beautiful songs, and it has since been made the subject of two novels, Zianirtza's *Heinrich Heine der Liederdichter* (1864) and Dietz's *Heinrich Heines erste Liebe* (1870). He failed in business, and at the expense of his uncle, Amalie's father, who aided him generously through life, he went in 1819 to study law at Bonn, where he came under the influence of A. W. Schlegel and the Romantic school in so far as it stood for the reawakening of the poetic spirit of the Middle Ages. He shared with them also a gift of irony, though in him this sprang from the incompatibility of two elements in his nature, a Greek joy of life inherited from his mother and fostered by the influence of Goethe, and a congenital Hebrew earnestness. There was never harmony between these antinomies of his character, and from their jarring came a mocking spirit that he possessed in higher degree than any other writer of the century. At Bonn under this new influence Heine wrote more lyrics and had begun a tragedy, *Almansor*, when he left Bonn for Göttingen; and, being soon suspended from the university there for participation in a frustrated duel, he went to Berlin, where he came under the influence of the philosopher Hegel and associated with Grabbe, Immermann, Willibald Alexis, Gans, Moser, Chamisso, Fouqué, and particularly with Varnhagen and his wife Rahel, who led him to a juster appreciation of Goethe, though he never became one of his unqualified admirers.

In Berlin Heine's genius found warm appreciation. He essayed journalism and in 1822 published a volume of poems (*Gedichte*), which for delicacy, fancy, conciseness, originality, and depth of lyric expression had no equal in Germany. A second volume (1823) contained the *Lyrisches Intermezzo*, which served to carry off two tragedies, *Almansor* and *Ratcliff*, his sole dramatic efforts. The *Intermezzo* is more bitter, reckless, sensual, than the *Poems*, but contains some of his most perfect lyrics. At home, Heine tells us, his mother read it and did not like it; his sister tolerated it; his brothers did not

understand it, and his father did not read it at all. In 1823 a visit to the North Sea inspired *Heimkehr*, which with the later North Sea cycle (*Nordsee Cyclus*) are among the world's best poems of the sea, worthy to rank with the best of Byron or Shelley. The year 1824 brought him to Göttingen again, and in June, 1825, he submitted to baptism that he might obtain an advocate's license. "I assure you," he writes to a friend, "if the law had allowed stealing silver spoons instead, I should not have been baptized." During the second stay at Göttingen Heine made the tour of the Harz Mountains and wrote the *Harzreise* (1826), sparkling with inimitable humor, the best known of his prose works. After taking his degree he revisited the North Sea and wrote *Norderney*, incorporated with the *Harzreise* in the *Reisebilder* (Pictures of Travel), which later embraced also *Das Buch Le Grand* and *Die Bäder von Lucca*. Such light, easy, sparkling prose, such graceful, daring, bubbling wit, had never yet been known in Germany, and the *Reisebilder* remain an unapproached model. Heine in this field has never been equaled save by himself, and he has not always maintained the level of the *Harzreise*. The *Buch Le Grand*, written in 1826, was revolutionary in tendency and in its admiration for Napoleon. Heine thought it safer to abide its publication in England (1827). It was enthusiastically received and generally prohibited by the police. It was graceful, grotesque, cynical, naive; it had a brilliancy, a vigor, a keenness of scorn, a fire of enthusiasm, that have seldom been surpassed. Heine made but a short stay in England, which was not congenial to him. He said, "The Ocean would have swallowed it long ago if he had not been afraid it would make him seasick." He admired, however, the liberty of England. In September, 1827, he was again in Hamburg, seeing through the press his collected lyrics, the now famous *Buch der Lieder*. Thence he went to Munich, tried journalism, hoped in vain for a professorship of German literature, and then attacked Massmann, the successful candidate, as well as King Ludwig. In July, 1828, he went disappointed to Italy, a journey that he describes after his manner in *Die Bäder von Lucca*—brilliant, witty, entertaining, immoral, coarse, revolutionary, and atheistic. After this Prussia was closed to him; influential men had been made his mortal enemies wantonly, and in the case of the poet Platen (q.v.) Heine's enmity assumed an utterly indefensible shape. Having been recalled to Hamburg by his father's death, Heine went in 1829 to Helgoland, where he gave himself up for two months to the fascination of the sea. He returned to his family in Hamburg famous throughout Germany as the author of the *Reisebilder*, the third volume of which appeared early in 1830, but as much feared as admired, and fiercely attacked on the part of those whom his reckless satire had wounded. Prussia, whose government had prohibited the circulation of the third volume of the *Reisebilder*, was now closed to him, and the thought of a professorship, which he had long cherished, had to be abandoned. He turned his thoughts to Paris. The news of the French revolution of 1830 reached him in Helgoland, where he spent the summer of that year, and filled him with enthusiasm. May, 1831, saw Heine in Paris, which remained his home till death.

Heine's first years in Paris were busied with

journalism and dreary feuds with German Liberals. He soon found himself at home in the French capital and enjoyed the society of Madame Récamier, Balzac, Dumas, George Sand, Béranger, Thiers, Chopin, Liszt, Berlioz, and many lesser celebrities. He pretended to consider it his mission to draw Germany and France closer together and wrote a series of papers on French conditions for the Augsburg *Allgemeine Zeitung*, which he republished in French. But not a few of his letters to the German press, even his art critiques, fell under the censor's pencil. In 1833, however, his acute critical study, *Die romantische Schule*, established his fame in France and opened to him the great *Revue des Deux Mondes*, in which he printed his *History of Religion and Philosophy in Germany since Luther*, a work of brilliant suggestiveness, which afterward appeared in Heine's own German version as *Zur Geschichte der Religion und Philosophie in Deutschland*. The satiric *Memoiren des Herrn von Schnabelewopski*, half autobiography, belong to this time. The scandal caused by his irregular life was checked by his "conscience marriage" with Mathilde Mirat (1834). They were legally married in 1841 and remained closely attached till the poet's death. He had provided for her, and she lived till 1883. Financial embarrassments now led Heine to seek a pension from the French government. Though he had always criticized his patrons freely, the fact was bitterly remembered against him when it became known in 1848. From 1834 to 1842 his literary work is comparatively unimportant. A fragment of a novel, *Florentinische Nächte*, an essay on German mythology, and a slanderous attack on his fellow exile and journalistic critic Börne, may be merely mentioned. But in 1842 he wrote *Atta Troll* (Hamburg, 1843), a brilliant poetic satire on German politicians and on the Romantic school, and in 1843 a brief visit to Germany evoked *Neue Gedichte* and *Deutschland, ein Wintermärchen* (1844), keenly satiric, which became immensely popular. Disease now laid an unrelaxing hand on him. His eyes were affected, then his vocal cords, then his spine. The death of his generous uncle, Salomon Heine, from whom he had received a yearly stipend of 4800 francs, and the disgraceful meanness of his cousin, added to his sufferings. But he forced the continued payment of the annuity. These years of sufferings show Heine in a nobler light than any in which he had yet appeared. In sleepless nights he composed wonderful songs on his "mattress grave." His legs were paralyzed; to see he was obliged to hold up an eyelid with an emaciated finger; his hearing was weak. It was, he said, "a grave without rest, death without the privileges of the departed." But it brought a deeper, almost a spiritual, earnestness into his life. He "returned to God like a Prodigal Son, after tending swine with the Hegelians." In this mood he wrote the poems of *Romancero* (1851), so tender, so melodious, so exquisite in fancy, that it seems almost past belief that they should have been the product of the sleepless nights of a bedridden sufferer; humorous pieces, like "The White Elephant," fierce political songs, like "The Weaver's Marseillaise," and the weird "Lazarus Cycle," written under the very shadow of death. Never had Heine been so many-sided as now. He continued to work as long as he could hear and speak. Many friends cheered

him, among them, as poems testify, the talented Camille Selden, "*la mouche*," and his "little fairy," the motherly Caroline Jaubert. Two miscellaneous volumes, headed by *Gestundnisse*, appeared in 1854. His *Memoirs*, of which some parts have been published, occupied him to the eve of his death. His last words were "Paper and pencil." He died Feb. 17, 1856, and was buried in Montmartre Cemetery without religious service.

Heine was essentially a realist, a revolutionary reformer, but never a blinded partisan. He speaks for a restless, questioning, dissatisfied age that has lost for the moment its ethical moorings. He is the most delicate and graceful song writer and incomparably the wittiest, clearest, keenest, and most unprincipled satirist of Germany, and so he is read with delight by an introspective and critical generation.

Heine's *Works* appeared in 21 volumes (1861-63) and in 20 volumes (1865). They have been often reëdited. The best critical edition is that in seven volumes by E. Elster (1887-90). Translations of the *Poems* by E. A. Bowring are in "Bohn's Library." There is an American translation of the *Pictures of Travel*, and a version of the *Works* by Leland and others was published in New York in 1906; *Wit, Wisdom, and Pathos of Heinrich Heine*, by Snodgrass, appeared in London (1888). The best English critique of Heine is in Matthew Arnold's *Essays*. Consult also essay by George Eliot. There is an English *Life, Work, and Opinions of Heinrich Heine*, by Stigand (London, 1876). The most complete German biography is by Strodtmann (3d ed., Berlin, 1884). Consult also those by Prülls (Stuttgart, 1886); Karpeles (Berlin, 1888); also his *Heine: Aus seinem Leben und aus seiner Zeit* (Leipzig, 1899); Keiter (Cologne, 1891), besides Brandes, *Das junge Deutschland* (Leipzig, 1890); id., *Die Litteratur des 19. Jahrhunderts*, vol. vi (ib., 1891); Betz, *Heine in Frankreich* (Zurich, 1895); Mietzki, *Heinrich Heine als Dichter und Mensch* (Berlin, 1895); Nassen, *Heinrich Heines Familienleben* (Fulda, 1895); Kaufmann, *Heines Liebesleben* (Zurich, 1898); id., *Heines Charakter* (ib., 1901); Steinmann, *Heinrich Heine: Denkwürdigkeiten und Erlebnisse aus meinem Zusammenleben mit ihm* (Prague, 1757); Hüfner, *Aus dem Leben Heinrich Heines* (Berlin, 1878); Franzos, *Heines Geburtstag* (ib., 1900); W. Bölsche, *Heinrich Heine, Versuch einer aesthetisch-kritischen Analyse seiner Werke* (Leipzig, 1888); A. Bartels, *H. Heine, auch ein Denkmäl* (Dresden, 1906); E. Moos, *Heine und Düsseldorf* (Düsseldorf, 1908); E. Eckertz, *Heine und sein Witz* (Berlin, 1908); H. Reu, *Heine und die Bibel* (Munich, 1908); H. J. Forman, *In the Footprints of Heine* (Boston, 1910); Edward Thorn, *Heinrich Heines Beziehungen zu Clemens Brentano* (Berlin, 1913).

HEINECCIUS, hī-nēk'tsī-us, JOHANN GOTTLIEB (1681-1741). A learned jurist of Germany, born at Eisenberg. He studied theology at Leipzig and law at Halle, where in 1713 he was made professor of philosophy and in 1720 professor of law. In the latter capacity he went in 1723 to Franeker and in 1727 to Frankfort-on-the-Oder, but in 1733 returned, as professor of law and philosophy, to Halle, where he died Aug. 31, 1741. His works display a thorough acquaintance with all departments of jurisprudence, but especially with Roman and German law; and their varied learning, logical arrange-

ment, and elegant Latin long maintained for them a classical character. His *Antiquitatum Jus Romanum Illustrantium Syntagma* was re-edited as recently as 1841 by Mühlenbruch; and his *Elementa Juris Civilis Secundum Ordinem Institutionum* (ed. by Biener, 1815), his *Elementa Juris Secundum Ordinem Pandectarum*, etc., are still studied by jurists.—Heineccius' son, JOHANN CHRISTIAN GOTTLIEB HEINECCIUS (born 1718 at Halle; died 1791 at Sagan), was for a long time professor in the academy for young noblemen at Liegnitz and edited, besides several of his father's works separately, a complete collection of them (*H. Opera Omnia*, 9 vols., Geneva, 1771), and wrote an account of his father's life and work, *Commentarius de Vita et Scriptis J. G. Heineccii*.—Heineccius' brother, JOHANN MICHAEL HEINECCIUS (born at Eisenberg, 1674; died Sept. 11, 1722), was a celebrated pulpit orator in Halle and also the first who studied seals scientifically. His theological writings are forgotten, but he is remembered by his *De Veteribus Germanorum Alvarumque Nationum Sagillis* (Leipzig, 1710; 2d ed., 1719), and by the work edited in conjunction with Leuckfeld, *Scriptores Rerum Germanicarum* (Frankfort, 1707).

HEINITZ, hī'nits, FRIEDRICH ANTON, BARON (1725–1802). A Prussian statesman, born at Dröschkau, near Torgau. He studied mining and smelting at Kösen, Dresden, and Freiberg, filled several government positions, and planned the Freiberg Academy of Mines. He also took great interest in forestry and in road building, traveling all over the Continent to study the prevailing conditions. In 1777 he left the Saxon for the Prussian service on his appointment as head of the departments of Mining and Smelting and in this capacity did much to develop the iron and coal industries. He published: *Mémoire sur ma gestion des fe et se départements* (1788), a defense of his administration of the Bureau of Commerce and Manufacture; and anonymously, *Essai d'économie politique* (1785) and *Mémoire sur les produits du règne minéral de la monarchie prussienne* (1786). Consult Reimann, *Abhandlungen zur Geschichte Friedrichs des Grossen* (Gotha, 1892).

HEINRICH, hīn'rik, GUSTAV (1845–). A Hungarian literary critic, born at Budapest and educated at Leipzig and Vienna. He was appointed professor of German philology in the university at Budapest in 1875 and became a prominent educator and a special student of the interrelation of German and Hungarian literature. He edited many German classics for Hungarian readers and wrote: *Bankban in der deutschen Dichtung* (1879); *Boccaccio's Leben und Werke* (1882); *Etzelburg und die ungarische Hunnensage* (1882); *Deutsche Verslehre* (2d ed., 1878); *Faust-Studien* (1888); *Kudrun* (1885), and a valuable history of German literature in Hungarian. After 1877 he edited the *Allgemeine philologische Zeitschrift*, from 1881 to 1889 the *Ungarische Revue*, and after 1897 the *Altungarische Bibliothek*.

HEINRICH DER GLICHEZARE, dër glêk'-e-tsä're (the Hypocrite). An Alsatian gleeman of the twelfth century. He wrote (c.1170) the earliest German poem on Reynard the Fox, copied freely after French models. Of this poem, *Isengrimes Nôt*, in its original form, nothing is left save a few fragments, edited by Grimm, *Send-schreiben an K. Lachmann über Reinhart Fuchs* (1840); a revision, only a little later in date,

was published by Reissenberger (1886). Consult Büttner, *Studien zu dem Roman de Renart und dem Reinhart Fuchs* (Strassburg, 1891).

HEINRICH DER TEICHNER, dër tik'nër. An Austrian didactic poet of the latter half of the fourteenth century. His poetry consists largely of proverbs and fables in rhymed couplets, valuable for their record of the reconstruction of Austrian life of the period. Selections from his works are to be found in Grimm's *Alt-deutsche Walder* (3 vols., Cassel, 1813–16). Consult Karajan, *Ueber Heinrich den Teichner* (Vienna, 1855).

HEINRICH VON DEM TÜRLIN, fön dem tür'lën. A German (Carinthian) poet of the earlier half of the thirteenth century. His poems deal with the legends of the Round Table and are modeled after Chrétien de Troyes. His *Der Aventure Krone* (c.1215), a long, dreary, and rather coarse epic recounting the adventures of Sir Gawain, was edited by Scholl in the publications of the *Stuttgarter literarischer Verein* (1852); and *Der Mantel*, which relates the story of the marvelous cloak that will fit none but a pure woman, has been published by Karnatsch (1883). Consult Martin, *Zur Gralsage* (Strassburg, 1880).

HEINRICH VON DIESENHOVEN, fön dës'en-hö'fën (c.1300–76). A mediæval German historian, born in Thurgau, canon of the cathedral at Constanz and chaplain of Pope John XXII at Avignon. His history completes the ecclesiastical chronicle of Ptolemy of Lucca and deals with the pontificate of John. It is edited by Böhmer in *Fontes Rerum Germanicarum*, vol. iv (Stuttgart, 1868).

HEINRICH VON FREIBERG, fön frī'bërk (or VRIBERG). A German poet of the early part of the fourteenth century. He wrote a spiritual poem, *Vom heiligen Kreuze*, probably from a Latin source, edited by Fietz (1881); *Ritterfahrt Johannis von Michelsberg*, written about 1305, edited by Kraus (1888); and a continuation of Gottfried's epic *Tristan*, composed about 1300, in style similar but unequal to Gottfried's, and following other originals for material. The farce entitled *Vom Schrätel und vom Wasserbar*, edited in Von der Hagen, *Gesamtabenteuer*, No. 65 (1850), is attributed to Heinrich von Freiberg. Consult Wiggers, *Heinrich von Freiberg als Verfasser des Schwankes vom Schrätel und vom Wasserbären* (Rostock, 1877).

HEINRICH VON HERFORD, fön hër'fört (?–1370). A German Dominican monk, author of many theological and important historical works and of a valuable chronicle, *Liber de Rebus Memorabilibus*. Its latter part is one of the most important sources for the history of the thirteenth and fourteenth centuries and was edited by Potthast (1859).

HEINRICH VON LAUFENBERG, fön lou'fën-bërk (c.1390–1460). A German poet and monk of the order of St. John, born in Switzerland. He lived at Freiburg and Strassburg and wrote numerous hymns in honor of the Virgin, of which 100 are to be found in Wackernagel, *Das deutsche Kirchenlied* (1864–77); a collection of *Carmina Figurata* (1441), also praising Mary; and a German translation of the *Regimen Sanitatis*, under the title *Spiegel menschlichen Heils* (1437).

HEINRICH VON MELK, fön mël'k. A German satirist of the twelfth century, a monk in the Austrian cloister of Melk. He wrote a vivid, bitter satire on the morals of the time and espe-

cially on the condition of the clergy, *Von des Todes Erinnerung* (c.1160), sometimes called, from its opening line, *Von dem gemeinen Leben*. The *Pfaffenleben*, an incomplete poem of like character, but probably not by Heinrich, was published with it (by Heinzel, Berlin, 1867). Consult: Lorenz, *Heinrich von Melk* (Halle, 1886); Kochendorfer, in the *Zeitschrift für deutsches Altertum*, vol. xxxv (Berlin, 1890); Wilmanns, *Beiträge zur Geschichte der älteren deutschen Literatur*, part i (Bonn, 1885).

HEINRICH VON MORUNGEN, fōn mō'run-gen. A German (Thuringian) minnesinger, of the end of the twelfth and the first quarter of the thirteenth century, ranking in beauty and originality next to Walther von der Vogelweide. His poems, showing strongly the influence of classic mythology and of the troubadours of Provence, are edited by Von der Hagen in his *Minnesinger* (1838) and in Lachmann and Haupt's *Des Minnesangs Frühling* (5th ed., 1910). Consult: Paul, *Beiträge zur Geschichte der deutschen Sprache und Literatur*, vol. ii (Halle, 1875); Michel, "Heinrich von Morungen und die Troubadours," *Quellen und Forschungen*, vol. xxxviii (Strassburg, 1880); Rössner, *Untersuchungen zu Heinrich von Morungen* (Berlin, 1898).

HEINRICH VON MÜGELN, fōn mʏ'gēln (c.1310-c.1375). A German author and scholar, a counselor of Charles IV at Prague and later of Rudolph IV of Austria. His works include translations of Valerius Maximus (first printed, 1489), and of the commentary on the Psalms written by Nikolaus of Lyra; an Hungarian chronicle in Latin (ed. by Engel, in *Monumenta Ungarica*, 1809); an allegory, *Der meide cranz*; and fables and *minne* poetry (ed. by Müller, 1848), which won him a place among the 12 founders of the art of the minnesingers. Consult Helm, "Zu H. von Mügel," in the *Beiträge zur Geschichte der deutschen Sprache und Literatur*, vols. xxi, xxii (Halle, 1896-97).

HEINRICH VON NEUSTADT, fōn noi'shtát. A German poet, born at Wiener-Neustadt, who appears as a physician, in a document of 1312, in Vienna. His works, imitative of Wolfram von Eschenbach, include a long epic (c.21,000 verses), patterned after the Latin story of Apollonius of Tyre, but with a curious coloring from Arthurian story; and *Von Göttes Zukunft*, reminiscent of Alanus ab Insulis' *Anticlaudianus*. Excerpts from the two poems are published in Strohl, *Heinrich von Neustadt* (Vienna, 1875).

HEINRICI, hin-ré'tsé, KARL FRIEDRICH GEORG (1844-). A German Protestant theologian, born at Karkeln in East Prussia and educated at Halle and at Berlin, where in 1871 he became docent. In 1873 he became professor at Marburg and went to Leipzig in 1892. In 1909 he became a fellow of the Royal Saxon Society of Learning and in 1911-12 was rector magnificus at Leipzig. He wrote: *Die valentinianische Gnosis und die heilige Schrift* (1781); *Erklärung der Korintherbriefe* (1880-87); the commentary, in Meyer's *Kritisch-exegetischer Kommentar über das Neue Testament*, on First Corinthians (9th ed., 1910) and Second Corinthians (8th ed., 1900); *Schriftforschung und Schriftautorität* (1890); *Theologische Encyklopädie* (1893); *Beiträge zur Geschichte und Erklärung des Neuen Testaments* (5 parts, 1894-1908); *Das Urchristentum* (1902); *Hellenismus und Christentum* (1909); *Die Eigenart des Christentums*

(1911); *Die Bodenständigkeit der synoptischen Uebersetzung vom Werke Jesu* (1913).

HEINS, hīnz, GEORGE LEWIS (1860-1907). An American architect. He was born in Philadelphia, studied at the University of Pennsylvania, and graduated from Massachusetts Institute of Technology in 1882. He then worked in architects' offices at Minneapolis and St. Paul, Minn. In 1884 he became associated with John La Farge (q.v.) in New York City, and later, in collaboration with C. G. La Farge (q.v.), he designed the Protestant Episcopal Cathedral of St. John the Divine. He was also one of the architects of the New York Rapid Transit Commission, of the buildings of the New York Zoological Park, of the church of the Divine Paternity, and of other structures in New York City. From 1898 until his death he was State architect of New York—the first to receive this appointment.

HEINSE, hīn'ze, JOHANN JAKOB WILHELM (1749-1803). A German novelist, translator, and critic of art, born at Langewiesen in Thuringia. He studied law and ancient and modern literature at Jena and at Erfurt, where he met Wieland, who greatly influenced his poetry, and Gleim, who procured for him a place as private tutor at Halberstadt (where he lived under the name of Rost). In 1774 he went to Düsseldorf as editor of *Iris*. Here he became so interested in art that he spent three years in Italy, giving most of the time to Rome. He made the acquaintance of the painter Müller, learned much of Italian art and literature, and widened his knowledge of the art and literature of antiquity. While he was in Italy he translated Tasso's *Gerusalemme Liberata* and the *Orlando* into German prose. On his return to Düsseldorf (1784) he wrote *Ardinghello*, his masterpiece, in which he gives his ideas on painting. The Elector of Mainz, Friedrich Karl Joseph, now (1786) made him his lektor and (1787), at Aschaffenburg, his private secretary. On Friedrich's death his library became the property of the state, and Heinse was made librarian. His earliest work was *Sinngedichte* (1771). This was followed by translations and works in classic vein: *Begebenheiten des Enkolp, aus dem Satyricon des Petron übersetzt* (1773); *Die Kirschen* (1773), a work of equal obscenity; and *Laidon, oder die eleusinischen Geheimnisse* (1774), with the form of a romance, describing the apotheosis of Lais. Like the last-mentioned work, *Ardinghello, oder die glückseligen Inseln* (last ed., 1838) is little more than a series of dazzling pictures, like Pompeian wall paintings. In *Hildegard von Hohensthal* (last ed., 1838), his second masterpiece, Heinse gives his ideas on music, and in *Anastasia und das Schachspiel* (last ed., 1831) on chess. *Fiormona, oder Briefe aus Italien* (1803), though usually ascribed to Heinse, is not his work. H. Laube issued his works in 10 volumes (1838); new critical edition by Schüddekopf (1907). Consult: *Briefe zwischen Gleim, Heinse und Johannes von Müller*, edited by Kürte (Zurich, 1806-08), which gives a good picture of the man and contains his criticism of the paintings in the Düsseldorf Gallery; Schober, *Heinse, sein Leben und seine Werke* (Leipzig, 1882); H. Pröhle, *Lessing, Wieland, Heinse* (Berlin, 1877-79); K. D. Jessen, *Heinse's Stellung zur bildenden Kunst* (ib., 1901).

HEINSIUS, hīn'si-qs, ANTONIUS (1641-1720). A Dutch statesman, celebrated as a formidable opponent of Louis XIV of France. He was born at Delft, Nov. 22, 1641, and after pur-

suing the study of law at the University of Leyden entered the service of the state and became in 1679 Pensionary of Delft. He was the confidential friend of William of Orange, upon whose accession to the throne of England, in 1689, Heinsius, as Pensionary of Holland (see *GRAND PENSIONARY*), succeeded to the virtual control of the foreign policy of the Dutch Republic. The friendship between William and Heinsius continued till the former's death, and their correspondence is of capital importance for the light it throws on the intricate political problems of the period from 1688 to the outbreak of the War of the Spanish Succession. Heinsius was instrumental in bringing about the partition treaties of 1698 and 1700, which had in view the dismemberment of Spain, and contributed to the formation of the Grand Alliance in 1701. Into that struggle against France he entered heart and soul, and after William III's death, in 1702, became the virtual leader of the European combination against Louis XIV. The victories of Marlborough and Prince Eugene were due in no little measure to Heinsius' restless activity in the prosecution of the war. Determined upon the total humiliation of France, he spurned the French King's overtures of peace, made as early as 1706; and only the defection of England and the reemergence of French resistance that followed induced him to agree to the terms of peace at Utrecht. He died Aug. 3, 1720.

HEINSIUS, DANIEL (1580-1655). A Dutch scholar of distinction and a pupil of Scaliger, born in Ghent. He was a leading figure of the Dutch Renaissance, professor of Greek at Leyden, and a facile Latin poet. He wrote: *Iambi* (1602); *Elegia* (1603); *Emblemata Amatoria*, with Dutch verses (1604); *Poemata* (1605). He edited Theocritus, Bion, Moschus, Horace, Aristotle, Seneca, Terence, and Livy, and published *Latin Orationes* (1609 and 1621) and other learned works as well as a Dutch tragedy, *The Massacre of the Innocents* (1613), and *Dutch Poems* (1616).—**NICOLAAS HEINSIUS** (1620-81), a son of Daniel, was born in Leyden and educated in the university of his native town. For more than 25 years he led the busy life of traveler, scholar, diplomat, and poet. He ransacked the libraries of France and Italy for classical manuscripts. In 1650 he entered the service of Christina of Sweden and in 1654 became Dutch Minister at Stockholm. In 1669 he visited Russia and two years later retired to private life. He published editions of Vergil, Ovid, Prudentius, Vellius Paterculus, and Valerius Flaccus, based on manuscripts in his possession, as well as commentaries on many other poets of antiquity. He is said to have supplied Milton with facts for use against Salmasius (q.v.). His Latin poems were published at Amsterdam in 1666. He died at The Hague, Oct. 7, 1681.—His illegitimate son **NICOLAAS** (1655-?) was a scapegrace of remarkable talent, who wrote the only original Dutch romance of the seventeenth century, *The Delightful Adventures and Wonderful Life of Mirander* (1675), a curious anticipation of *Gil Blas*. He fled from Holland, a disowned criminal, in 1677 and died in obscurity.

HEINTZELMAN, hîntsel-män, **SAMUEL PETER** (1805-80). An American soldier, born at Manheim, Lancaster Co., Pa. He graduated at West Point in 1826 and was assigned to the Second Infantry, with which he served on the frontier. He took part in the wars with the Florida

Indians from 1835 to 1841, becoming a captain in 1838; served with his regiment in the Mexican War, and received the brevet of major for gallantry at the battle of Huamantla, Oct. 7, 1847. Later he served in California, accompanying the expedition against the Yuma Indians in 1852, and in Texas. He attained the rank of major in 1855 and at the outbreak of the Civil War became colonel, and inspector general of the Department of Washington. On May 17, 1861, he was commissioned brigadier general of volunteers and was in command of the forces which occupied Alexandria, Va. In McClellan's Peninsular campaign of 1862 he commanded the Third, and later also the Fourth, Army Corps and participated in all of the important battles. He received his commission of major general of volunteers on the day of the battle of Williamsburg (May 5, 1862), and for gallantry at the battle of Fair Oaks received the brevet rank of brigadier general in the regular army. He fought also at Savage's Station, Glendale, and Malvern Hill, and later in the year at the second battle of Bull Run and at Chantilly. In the winter of 1862-63 he was in command of the defenses of Washington, and from February to October, 1863, of the Department of Washington. During the remainder of the war he was not in the field, serving as commander of the Department of the West in 1864 and on court-martial duty in 1865. In March, 1865, he was brevetted major general in the United States army for his conduct at Williamsburg and in 1869 was retired, on account of age, with the full rank of major general.

HEINZ, hints, **HENRY JOHN** (1844-). An American packer of food products, born in Pittsburgh, Pa. After receiving his education in the public schools and at Duff's Business College, in 1869 he entered, at Sharpsburg, Pa., the business in which eventually he made a fortune. In 1872 he moved to Pittsburgh and formed the partnership of Heinz, Noble & Company, which became F. & J. Heinz, and finally in 1888 the H. J. Heinz Company. The partnership, which had remained under this last name, was replaced by a corporation in 1905 with Heinz as president. The firm grew until it had 14 branch factories, 42 branch houses, and agencies in all parts of the world. It early became famous through its advertising. H. J. Heinz became a director in various industrial, civic, and philanthropic organizations, and was chosen chairman of the executive committee of the World's Sunday School Association.

HEINZE, hîntse, **F. AUGUSTUS** (1869-1914). An American mining engineer and capitalist, born in Brooklyn, N. Y. He attended the Polytechnic Institute, Brooklyn, graduated from the Columbia School of Mines in 1889, and studied also in Germany. His remarkable early success in smelting and mining operations in Montana made him a millionaire and "copper king" before he was 30—he became president of the United Copper Company and director of the Montana Ore Purchasing Company. With the help of his brother Arthur, a lawyer, Heinze carried on for nine years a mine claims' fight with Marcus Daly and Daly's successors, the Amalgamated Copper Company (i.e., the Standard Oil interests). War was waged in the mines as well as in the courts. In 1906 Amalgamated admitted defeat. In 1907 Heinze's attempt to effect a corner in copper failed; there was a run on the Mercantile National Bank, of which

Heinze was then president; and a country-wide financial panic was precipitated. Heinze resigned his bank presidency; was obliged to sacrifice huge blocks of stock to meet his obligations (though he saved a comfortable fortune), and the United Copper and Montana Ore Purchasing companies went into the hands of receivers.

HEINZE, hin'tse, KARL FRIEDRICH RUDOLF (1825-96). A German criminologist, born at Saalfeld and educated at Leipzig. He served successively in the judiciary of Meiningen and of Saxony; in 1865 was appointed professor of jurisprudence at Leipzig, and eight years afterward at Heidelberg. He was three times representative of the University of Leipzig in the Saxon Diet and was a prominent member of the party of the opposition. His works, which treat especially the reform of German criminal law and criminal procedure, include: *Parallelen zwischen der englischen Jury und dem französisch-deutschen Geschworenengericht* (1864); *Ein deutsches Geschworenengericht* (1865); *Das Recht der Untersuchungshaft* (1865); *Verhältnis des Reichsstrafrechts zu dem Landesstrafrecht* (1871); and a report for the International Congress for Prison Reform at St. Petersburg, *De quelle façon l'ivresse peut-être envisagée dans la législation pénale* (1890).

HEINZEL, hin'tsel, RICHARD (1838-1905). An Austrian philologist, born in Capodistria and educated at Vienna. After teaching in Gymnasias at Triest, Vienna, and Linz, he was appointed professor of German at Graz (1868) and then at Vienna (1873). His work comprises discussions of Germanic phonetics, Teutonic myths, and the relation of German poetry to French. Among his writings are: *Heinrich von Melk* (1867); *Geschichte der niederfränkischen Geschäftssprache* (1874); *Ueber den Stil der altgermanischen Poesie* (1875); *Beschreibung der isländischen Saga* (1880); *Ueber die Nibelungensage* (1885); *Ueber die Hervararsaga* (1887); *Ueber die Walthersage* (1888); *Ueber die ostgotische Hildensage* (1889); *Abhandlungen zum altdeutschen Drama* (1895); *Beschreibung des geistlichen Schauspiels im deutschen Mittelalter* (1898); *Ueber die französischen Gralromane* (1892); *Ueber das Gedicht von König Orendel* (1891); *Ueber Wolframs von Eschenbach Parzival* (1893); *Saemundar Edda* (2 vols., 1903), with F. Dettler. A *Festgabe*, entitled *Forschungen zur neueren Literaturgeschichte*, was presented to him in 1898. An edition of his *Kleine Schriften* was published by Jellinek and Von Kraus in 1907.

HEINZEN, hin'tsen, PETER (better known as KARL) (1809-80). A German-American author, born at Grevenbroich and educated at Bonn, whence he was expelled because of his radicalism. After two years in the Dutch army he returned to Germany and entered the service of the Aix-la-Chapelle Fire Insurance Company. But his contributions to the *Leipziger Allgemeine Zeitung* and to the *Rheinische Zeitung* excited the displeasure of the government; both journals were suppressed; his book, *Die preussische Bürokratie* (1845), was confiscated, and he escaped trial by flight to Belgium, Switzerland, and finally to America. He returned to take part in the revolution of 1848; then came once more to the United States; lived in New York, Louisville, Cincinnati, and, after 1860, in Boston, and published the very radical organ, the *Pionier*. His collected works were published at Boston (3

vols., 1868-72), and include: *Gedichte*; *Sechs Briefe an einen frommen Mann*; *Die Deutschen und die Amerikaner*; *The True Character of Humboldt*. Many of his writings were published by the Society for the Propagation of Radicalism in the United States—e.g., *Rights of Women* (1891) and *Teutscher Radikalismus in Amerika* (1898).

HEIR (Lat. *heres*). In the most general sense, the person entitled by law to succeed to an inheritance. At Roman law, the estate of a deceased person always passed as an entirety (by "universal succession") to one or more persons described as heirs. The heir or heirs, if not appointed by testament, were designated by the law; and in the later development of the Roman law certain near relatives of a testator were entitled to a share of his estate even against his will, unless they had so acted as to give him legal ground for disinheriting them. (See SUCCESSION.) If the heir, whether appointed by testament or designated by law, was under the decedent's household authority, the inheritance vested in him immediately. If, on the other hand, the inheritance was given by testament or assigned by law to a person out of the household, the latter became heir only by an act of entry. The chief practical importance of the distinction lay in the fact that inheritance established a merger, or "confusion," of the inherited estate with the personal estate of the heir, and that the heir was accordingly personally liable for the debts of the estate. If these exceeded the assets, the forced succession of the household heir was an injury to him. The praetors accordingly, towards the close of the Republican period, gave such heirs protection against the creditors of the estate, if they abstained from interfering with the assets—a change which practically abolished the forced or "necessary" succession. Justinian introduced a further reform, permitting an heir who promptly made an inventory of the assets to take the inheritance without incurring any personal liability for its debts (*beneficium inventarii*). See INVENTORY.

The position of a testamentary heir at Roman law was substantially identical with that of an English executor who is also a residuary legatee. The testamentary heir paid the debts and all special bequests (*legata*) and kept the remainder of the estate. The position of the intestate heir was substantially identical with that of an English administrator.

Mediæval Law. To the Germanic peoples, including the English, testaments were originally unknown. They received them through the Church. Even then they were reluctant to admit that a person could dispose by testament of the real estate, which in the Germanic view belonged to the family rather than to its head. The direct heirs, the "born" heirs, had rights in the land of which they could not be deprived. The development of the feudal system emphasized in the law of succession, as in other fields of the law, the distinction between realty and personality. To the Church authorities, accordingly, mediæval custom assigned not only the execution of testaments disposing of the personality, but also, in many countries, the administration and distribution of the personal estate in cases of intestacy. On the Continent and in Scotland, at the close of the Middle Ages, the reception of the Roman law (see CIVIL LAW) effaced these distinctions; but in England they

still underlie the whole law of inheritance and distribution (q.v.).

Modern Civil Codes. The modern codes of Europe have reestablished the principle of the universal succession; the estate of a decedent passes as an entirety to the testamentary or legal heir or heirs. The Roman distinction between household heirs and outside heirs has disappeared; in both cases the inheritance vests at the moment of death; in both cases there is a right of renunciation, and usually a right of entry, with the "benefit of inventory." In cases of intestacy the legal heirs administer the estate; the courts appoint administrators only when the intestate heirs cannot be found, or when they all renounce the inheritance. Unless a testator has appointed special executors, the testamentary heirs liquidate the estate and pay the legacies and statutory shares. In this matter, however, the French law is different. In France, if there be near relatives who are entitled to statutory shares, these, and not the testamentary heirs, administer the estate. The latter are termed "universal legatees," and they have the rights of heirs only in the absence of the "legitimate heirs."

English and American Law. The feudal separation of real and personal property has maintained itself in the common-law system even to the present time. It appears in its extreme form in the law of inheritance. The personal property of one who dies intestate passes to a person who may or may not be of the blood of the decedent, and only for purposes of administration, the distribution of the surplus after the payment of debts, etc., being determined by statutes of distribution. Only the real property "descends," according to fixed canons of inheritance, to the next of blood of the decedent, under the description of the heir. In English and American law, then, the term "heir" has reference always to the person or persons to whom the real (not the personal) property passes, and that not by will, but only on intestacy. In the main the English canons of descent laid down by Blackstone still govern the determination of the heirship or inheritance of estates, though these have been considerably modified by statute in England and still more in the United States. The principal difference is that in England the rule of primogeniture still obtains as well as the preference of the male to the exclusion of the female of equal degree of consanguinity, whereas in the United States the descent is to all who stand in the same degree of consanguinity to the ancestor, without distinction of sex. See DESCENT.

In Scottish law, the term "heir" is often used in a loose sense to denote the person entitled to succeed to the heritable as well as to the movable estate. In Scotland the same rule exists as in England, that if a person do not by deed *mortis causa* (which operates like an English will) dispose or convey his estate to some other person, the law points out who is to take such estate, and that person is the heir at law. The rules by which the heir to heritable estate in Scotland is pointed out differ considerably from the English rules. These rules are the same as to the descendants of the deceased person. But after his descendants are exhausted, differences begin; for then it is not the father, nor yet the eldest brother of the intestate, but the next younger brother, who succeeds; then the next younger again, until the youngest brother—after

whom and his descendants comes the next elder brother of the deceased, and so on upward to the eldest brother. In Scotland, when females succeed equally, they are called heirs portioners. The mother never succeeds in any event, nor any of her relatives, except brothers and sisters german who trace their descent through her.

Heir Apparent. In the common-law system, the person who is contingently entitled to succeed to the inheritance of real property if he outlive his ancestor. The term "heir" alone is not properly applicable to any one so long as the ancestor from whom he expects to inherit is still alive, in accordance with the maxim that no one can be the heir of a living person (*nemo est hæres viventis*). The expectant heir may be either the person who is first entitled under the canons of descent, as the eldest son, and who cannot be displaced by the subsequent birth of a nearer relative of the ancestor, or he may be a person in the second or any later degree of consanguinity—in which case he is liable to be displaced by the birth of a son or other person having a prior claim to the inheritance. The expectant heir in the former case is known as the heir apparent, in the latter case as the *heir presumptive*. Under the rule of primogeniture, which still obtains in England, a daughter would be only an heir presumptive, as the subsequent birth of a son to the father would displace her; whereas the eldest living son is, while the father lives, the heir apparent. A younger son, however, is not entitled to the designation of heir presumptive so long as his elder brother lives, although by the death of the latter he would at once become heir apparent.

In Scotland the phrase is also sometimes used popularly in this sense; but the words "apparent heir," when used technically there, mean quite a different thing, viz., the person who after his ancestor's death is entitled to succeed, provided he make up his titles, but who has not yet actually done so. The apparent heir has a year to deliberate, called the *annus deliberandi*, whether he will enter upon the property, because the responsibility is so much greater in Scotland than in England.

Consult the authorities referred to under CIVIL LAW; DESCENT; LAW; REAL PROPERTY; ETC.

HEIR-AT-LAW, THE. A comedy by George Colman the Younger, in five acts, produced in 1797 and still occasionally brought out.

HEIRESS, âr'ès. In heraldry, a lady having no brothers who leave issue; known as an "heir." The husband of an heiress is entitled to bear her arms in an escutcheon of pretense—i.e., a small escutcheon in the centre of his paternal shield—and the children of an heiress may quarter her arms with their paternal coat. Neither practice is of very early date in heraldry.

HEIRLOOM, âr'loom'. In English law, chattels which in some localities go to the heir at law by special custom instead of passing, as chattels commonly do, to the executor or administrator of the decedent. The chattels usually comprehended within this description are such homely but necessary articles as the best bed, table, pot, pan, cart, and the like. But articles of honor and ornament may fall within the category of heirlooms, such as family portraits, ducal coronets, the crown jewels, etc. The origin of the right is obscure, and it is of rare occurrence. In America it is wholly unknown. In Scotland a somewhat similar usage prevails, but of wider extent, whereby the best articles of furniture in

the house of a person who dies leaving heritable property pass under the description of *heirship movables* to the inheritor of the lands. The extent of this right is also not clearly settled. Consult the *Commentaries* of Blackstone and Erskine.

HEIR OF LINNE, lin. A ballad of unknown date and authorship, preserved in Percy's *Reliques*.

HEIS, his, EDUARD (1806-77). A German astronomer, born at Cologne and educated at Bonn. He became an instructor at Cologne in 1827, at Aix-la-Chapelle in 1837, and in 1852 was appointed professor of mathematics and astronomy at Münster. Heis edited *Wöchentliche Unterhaltungen aus dem Gebiete der Astronomie und Meteorologie*, and was author of *Neuen Himmelsatlas* (1872), marking all stars visible to the naked eye; *Zodiakallicht-Beobachtungen in den letzten 29 Jahren, 1847-75* (1875); *Sammlung von Beispielen und Aufgaben aus der allgemeinen Arithmetik und Algebra* (95th ed., 1896); and, with Schweiler, a *Lehrbuch der Geometrie*, in three volumes.

HEISS, his, MICHAEL (1818-90). An American Roman Catholic prelate. He was born at Pfahldorf, Bavaria, studied at Munich and at a Catholic seminary at Eichstätt, and was ordained in 1840. Two years later he came to the United States, engaged in missionary work in Kentucky and Ohio, and afterward at Milwaukee, where he founded the Seminary of St. Francis de Sales, of which he was first rector. He was consecrated first Bishop of La Crosse, Wis., in 1868, and established St. John's College and other schools in his diocese. In 1880 he was appointed coadjutor to the Archbishop of Milwaukee, and two years later became second Archbishop. He was a member of the Vatican Council of 1869-70.

HEJAZ, hē-jāz', or **HEDJAZ** (Turk., land of pilgrimage). A Turkish vilayet of Arabia (q.v.), extending along the northeast shore of the Red Sea from the Gulf of Akabah to about the parallel of 20° N. and to the Nafud Desert on the east (Map: Turkey in Asia, D 6). Its area is about 96,500 square miles. The district is hot, barren, and covered with sand and eruptive material. In the central part are the Tehema Mountains, reaching a height of 6000 feet in Jebel Shar (biblical Mount Seir). Vegetation is found only in a few oases. The estimated population is 300,000 Bedouins, an average of three per square mile. Within the confines of Hejaz are the sacred cities of Mecca and Medina. The chief port is Jeddah. A line of railroad, to be known as the Medina-Mecca-Jeddah line, is in course of construction by the Hejaz Railway Company.

HEJIRA, hēj'ī-rā (Ar. *hijra*, departure, flight, from *hajara*, to abandon). The departure of Mohammed from Mecca to Medina to escape the persecution of his kinsmen, the Koreish (see **MOHAMMED**), and the starting point of the Mohammedan era. The exact day of the departure is uncertain. The custom of dating events with reference to it originated with Mohammed himself, but the calendar was first instituted by Omar, 17 years after the event, and was made to begin, not with the day of the flight, but with the first day of the year (i.e., the first of the month Muharram) in which it took place, which corresponds with July 15, 622, of the Christian era. The Mohammedan year is a lunar year, of 354 days, 9 hours, hence about 11 days shorter

than the Christian year, and this fact must be borne in mind in computing the date of the Christian calendar corresponding to any given Mohammedan date. An easy rule, which will give the year approximately, is to deduct 3 per cent from the Mohammedan year and add the result to 622. Thus, the year of the Hejira 1332 will be found to correspond roughly to the year 1914 of the Christian era (1332 - 40 + 622 = 1914). For more accurate results, consult Wüstenfeld, *Vergleichungstabellen der mohammedanischen und christlichen Zeitrechnung*, continued by Mahler (Leipzig, 1854-87), and Hanauer, *A Table of the Christian and the Mohammedan Eras from July 15, A.D. 622, the Date of the Hejira, to A.D. 1900* (London, 1904).

HEKKING, hēk'ing, ANTON (1856-). A noted Dutch violoncellist, born at The Hague. Having received his first musical instruction in his native city, he entered the Paris Conservatory for further study under Chevillard and Jacquard. In 1882, together with Ysaye, he made an extensive and very successful tour of the principal cities of Europe. In 1888 he visited the United States, at the conclusion of which tour he lived for some years in Boston and New York. Together with Schnabel (piano) and Wittenberg (violin), he established in 1902 a trio in Berlin, which soon was recognized as one of the foremost chamber-music organizations of Germany.

HEKLA. See **HECLA**.

HEKTARE, hēk'tār. See **METRIC SYSTEM**.

HEKTOEN, hēk-tōen', LUDVIG (1863-). A distinguished American pathologist, born at Westby, Wis., of Norwegian parents. He graduated from Luther College (1883) and (1887) from the Chicago College of Physicians and Surgeons (where he was professor of pathology in 1892-94), and he studied also at Upsala, Prague, Berlin, and Vienna. From 1889 to 1903 he was pathologist to the Cook County Hospital; he held professorships in Rush Medical College; and in 1901 he became head of the department of pathology and bacteriology at the University of Chicago. He served as a member of the Occupational Disease Commission of Illinois (1899-1911); was president of the Association of American Pathologists and Bacteriologists (1903); and, besides editing the *Journal of Infectious Diseases*, he wrote *The Technique of Post-Mortem Examination* (1894) and was editor of Ducre's *Pathologic Histology* and co-editor of and contributor to the *American Text-Book of Pathology* (1901).

HEKTOGRAPH, hēk'tō-grāf (Gk. *ekarón*, *ekaton*, hundred, and *γράφω*, *graphō*, write). A copying device, consisting of a pad of specially prepared gelatin, in a shallow tin tray, upon which an impression is made from writing or drawing with so-called hektograph ink on a sheet of paper from which other impressions or duplicates can be made. The pad is prepared from glue or gelatin and glycerin according to various formulas, some of which involve also the addition of kaolin, barium sulphate, dextrin, oil of cloves, to prevent decomposition, and like substances. The gelatin is first swelled in cold water, and then it is added to hot glycerin and thoroughly stirred, after which it is poured into the pan and allowed to stand for five or more hours. Previous to using, the gelatin must first be moistened with a wet sponge and left till nearly dry, after which the writing is placed on its surface face down and rubbed on the back. The writing should be allowed to remain for

about a minute, and then copies may be taken by laying clean sheets of paper on the gelatin, pressing down, and removing carefully by a corner. The pad, after the desired number of impressions has been made, may be cleaned with a wet sponge, or the ink will be absorbed if left for a few days. In using the hektograph special inks are employed, which contain glycerin, gum, and alcohol, with such coloring materials as are desired.

HEL, hāl (Icel., probably meaning hidden, sc. goddess). The Northern goddess of the dead, who dwelt beneath one of the three roots of the sacred ash Yggdrasil and was the daughter of Loki (q.v.) by the giantess Angurboda. Hel, together with her brothers, the wolf Fenrir and the serpent Jormundgand, was bred up in the giants' home of Jötunheim, where she remained till, at the request of the Æsir, or gods, the All-father sent for her and her brothers. Knowing that by their origin these children must prove a source of calamity, he resolved upon their destruction, and after casting the serpent into the deep ocean which surrounds all lands, where it has grown so large that it encircles the whole world and bites its own tail, he hurled Hel into Niflheim (q.v.), over which he gave her authority, and in which she was to assign places to all who die of sickness and age. Her abode is surrounded by a high inclosure with massive gates. Her dwelling is *eljudnir* (preparer of pain); her dish, *hungur* (hunger); her knife, *sult* (starvation); her servants, *ganglāti* (slow moving); her bed, *kor* (sickness); and her curtains, *blíkt-andaból* (gleaming misery); and she is easily recognized by her fierce aspect and her half-black, half-flesh-colored skin; and she rides a horse with only three feet. Faith in this goddess is not yet extinct. Hel-shoes (hell-shoon) are still put on the feet of the dead, and her dog is heard barking to give warning that death is at hand. In Norway, when any one recovers from dangerous illness he is said to have given Hel a bushel of oats, in allusion to the belief that she wanders around in the form of a horse.

After the introduction and diffusion of Christianity the ideas personified in Hel gradually merged, among all the races of northern and German descent, in the local conception of a hell, or dark abode of the dead. Consult: Guerber, *Myths of Northern Lands* (New York, 1895); Mogk, *Germanische Mythologie* (Leipzig, 1906); Mortensen, *A Handbook of Norse Mythology*, translated by Crowell (New York, 1913).

HELBIG, hēl'bík, WOLFGANG (1839–). A German archaeologist. He was born at Dresden and was educated at Göttingen and Bonn. After he had taught one year in the Joachimsthaler Gymnasium of Berlin, he went to Rome as scholar in the German Archaeological Institute, of which he was made second secretary in 1865. This office he resigned in 1885, but he did not leave Rome, save for occasional trips through Italy, Greece, northern Africa, France, and Russia. His more important works are: *Wandgemälde der vom Vesuv verschütteten Städte Campaniens* (1868); *Untersuchungen über die campanische Wandmalerei* (1873); *Beiträge zur altitalienischen Kultur- und Kunstgeschichte* (1879); *Das homerische Epos aus den Denkmälern erläutert* (1887); *Führer durch die öffentlichen Sammlungen klassischer Altertümer in Rom* (last ed., 1913–14); *La collection Barracco d'après la classification et avec le texte de G. Barracco et W. Helbig* (1893).

HELD, hēlt, ADOLF (1844–80). A German

economist, born at Würzburg and educated there, at Munich, and at Berlin. He became an instructor in the university at Bonn in 1867, associate professor in 1868, and full professor in 1872. In 1880 he was called to a professorship at Berlin; but he died by drowning shortly afterward. Held's work is characterized by his insistence upon historical method, and by the prominence assigned by him to state influence in the economic order. He was one of the chief leaders of the tendency in German economics known as "Socialism of the Chair." His chief writings are *Careys Sozialwissenschaft und das Merkantilssystem* (1866); *Die Einkommensteuer* (1872); *Die deutsche Arbeiterpresse der Gegenwart* (1873); *Grundriss für Vorlesungen über Nationalökonomie* (1872; 2d ed., 1878); *Sozialismus, Sozialdemokratie und Sozialpolitik* (1877); and, edited by Knapp, *Zwei Bücher zur sozialen Geschichte Englands* (1881).

HELD, HANS HEINRICH LUDWIG VON (1764–1842). A Prussian patriot, born at Auras and educated at Frankfurt-on-the-Oder, Halle, and Helmstedt, where he studied law. For his open attack on the integrity of the Minister, Count Hoym, he was removed from his post in the customs service at Posen (1797); but four years afterward he published the famous "Black Book"—so called from its binding—a second attack on the ministers Hoym and Goldbeck, under the title *Die wahren Jakobiner im preussischen Staat, oder aktenmässige Darstellung der bösen Ränke und betrügerischen Dienstführung zweier preussischen Staatsminister*. For this publication, after a long trial, he was sentenced to 18 months in prison. His later writings were two pamphlets attacking Napoleon, and in 1805 a eulogy of his patron, Struensee. In 1812 he received a minor appointment from the Minister, Hardenberg; but the ill fortune of the preceding years had broken his spirit, and when the state money in his possession was stolen from him he despaired of life and committed suicide. He wrote a *Geschichte der drei Belagerungen Kolbergs im Siebenjährigen Kriege* (1848). Consult Grünhagen, *Zerboni und Held in ihren Konflikten mit der Staatsgewalt* (Berlin, 1897).

HELDENBUCH, hēl'den-būch (Ger., book of heroes). A collection of old epic poems, connected with the heroic legends of Germany. No manuscript exists, and the oldest printed edition is without date. The second copy was printed in 1491 and was afterward reprinted in 1509, 1545, 1560, and 1590, and edited by A. von Keller at Stuttgart in 1867. It is an adaptation preserving the general characteristics of the older poetic form and contains the poems "Ornit," "Hugdietrich," "Wolfdietrich," the "Great Rosegarden," and the "Little Rosegarden, or King Laurin." A similar but inferior adaptation of the same material, with additions from the tales of Attila and Dietrich, appeared about 1472. Of the latter work one manuscript exists, now in Dresden. The collection is known by the name of one of its two writers, Kaspar von der Rhön (Gaspard de la Roen).

HELDER, hēl'dēr. A strongly fortified seaport town of the Netherlands, situated on the narrow passage of Marsdiep which separates the mainland of the Province of North Holland from the island of Texel, 58½ miles from Amsterdam (Map: Netherlands, C 2). The city and surrounding country are protected from the inroads of the sea by an enormous dike, nearly 5 miles long and 30 feet wide at the top, built of Nor-

wegian granite; it descends 200 feet into the sea at an angle of 40°. A road on the top of the dike connects Helder with the harbor of Nieuwediep, the sea entrance to the North Holland Canal, which connects Helder with Amsterdam. Nieuwediep is one of the chief naval stations of the Netherlands, where are large docks, shipyards, barracks and magazines, a naval hospital, and the royal cadet school known as Willensoord. Owing to its position at the north end of the North Holland Canal, Helder has rapidly developed from a small fishing village into a city. Pop., 1910, 27,458. Helder is noted for the famous naval battle which took place there in 1673 between the united fleets of England and France, on one side, and the Dutch, on the other. The latter, led by Tromp and De Ruyter, were victorious. The fortifications of the town were begun in 1811 by Napoleon and completed afterward by the Dutch.

HELDERBERG, LOWER. See LOWER HELDERBERG.

HELE, hā'le, or **HENLEIN**, -PETER (1480-1542). A German clock maker of Nuremberg, who is credited with having made the first pocket timepiece, about 1511. In 1903 a statue was erected to his memory at Glashütte. His name is also spelled "Hell."

HELEN (Lat., from Gk. Ἑλένη). The daughter of Zeus and Leda (q.v.), wife of Tyndareus (q.v.), King of Sparta, or, according to the epic poem *Cypria*, of Zeus and Nemesis, whom the god pursued in the form of a swan. Nemesis brought forth an egg, which was found by Leda, who on the birth of Helen reared her as her foster child. According to the ancient legend she was so exceedingly beautiful that at the age of 10 she was carried off by Theseus and Pirithous, but was recovered subsequently by her brothers, Castor and Pollux. Tyndareus afterward engaged her suitors, who numbered about 30, in a solemn oath to unite together to aid the husband whom Helen should choose, should any attempts be again made to carry her off. In accordance with this oath, her husband, Menelaus, when she was afterward carried off by Paris (q.v.), son of Priam, King of Troy, summoned all the princes of Greece to avenge the injury he had sustained and thus gave rise to the Trojan War. The ordinary legend states that after the death of Paris she voluntarily married his brother, Deiphobus, and that on the taking of Troy, in order to recover the favor of Menelaus, she betrayed Deiphobus into his hands. (See *Aeneid*, vi, 517 ff.) Another version told how she fled to the temple of Aphrodite and was pursued with drawn sword by Menelaus; but such was the power of her beauty that he laid aside his thought of vengeance and took her once more as his wife. Their voyage home was long, as they were driven to Egypt, but at last reached Sparta in safety, where the *Odyssey* shows them living in happiness. By her husband Menelaus she had one daughter, Hermione, but some writers said that by Theseus she was the mother of Iphigenia. Of her death also there were many versions. Her grave was shown at Therapne, near Sparta, where she and Menelaus were worshiped. On the other hand, the Rhodians told how she was driven out of Sparta after the death of Menelaus and came to her friend, Polyxo, in Rhodes. Polyxo, however, had lost her husband in the Trojan War and consequently forced Helen to hang herself to a tree. Hence Helen was worshiped at Rhodes in connection with the tree, as

Helena δερδπιρος. Another story told how she was translated by the gods to the Islands of the Blest, where she was wedded to Achilles. She received divine honors at many places and was believed by the sailors to appear in the single flame of St. Elmo's fire, which was regarded as a sign of disaster, while the double flame, or Castor and Pollux, was believed to insure safety (see *ELMO'S FIRE*, ST.). In art scenes from the story of Helen are frequent and represent almost all the episodes in her eventful life. Stesichorus made Helen remain in Egypt, whither she had come with Paris on her way to Troy, detained by the Egyptian King, Proteus, who later restored her to her husband. Paris, he said, took to Troy only a phantom, for whom Greeks and Trojans fought. Much in the nature of the legends of Helen and in the characteristics of her worship seems to indicate that she was originally a moon goddess, who has been superseded by Selene and Artemis and thus transferred to the heroic legends. For a full collection of the ancient material relating to Helen, consult: Engelmann's article in Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. i (Leipzig, 1880-90); the article "Helene, 3," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. vii (Stuttgart, 1912); Oswald, *The Legend of Fair Helen* (New York, 1905); Gruppe, *Griechische Mythologie*, vol. i (Munich, 1906).

HELEN: A TALE. A novel by Maria Edgeworth, published in 1834.

HELENA, hēl'ē-nā. A city and the county seat of Phillips Co., Ark., 70 miles by rail southwest of Memphis, Tenn., on the Mississippi River, and on the St. Louis, Iron Mountain, and Southern, the Missouri and North Arkansas, and the Yazoo and Mississippi Valley railroads (Map: Arkansas, E 3). It has steamboat connection with St. Louis, New Orleans, and other river ports, and is an important shipping point for lumber, cotton, and cottonseed oil, and has lumber mills, cotton compresses, cottonseed-oil mills, box factories, stove mills, railroad shops, manufacturing of chairs, brooms, spokes and handles, and ice, foundries, etc. The city contains United States District, State, county, and municipal courts, fine Federal and high-school buildings, and several monuments to Civil War heroes. Here on July 4, 1863, General Holmes, commanding a Confederate force of 9000, attacked General Prentiss with a Union army of about 4500, but was repulsed with a loss in killed, wounded, and prisoners of one-fifth his number. Pop., 1900, 5550; 1910, 8772; 1914 (U. S. est.), 10,144.

HELENA, hēl'ē-nā. A city, the capital of Montana, and the county seat of Lewis and Clark County, 72 miles by rail north by east of Butte, on the Great Northern and the Northern Pacific railroads (Map: Montana, D 3). It lies at an elevation of 4200 feet, overlooking Prickly Pear valley, a fertile agricultural district, and is surrounded by a highly productive mineral region. It is one of the commercial centres of the State, is extensively engaged in gold, silver, and copper mining, and in sheep and cattle raising, and has foundries and machine shops, quartz and planing mills, mining-machinery works, manufacturing of soap, candles, candy, and crackers, and smelters. From the famous Last Chance Gulch, which traverses the city, it is estimated that more than \$30,000,000 worth of gold has been mined. Helena was settled as a mining camp in 1864 and laid out as a town in the same year

and was incorporated in 1881. The city is the seat of the Montana Wesleyan University, opened in 1890, of Mount St. Charles College, and St. Vincent's Academy, and has public, State, and other libraries, and a United States Assay Office. Other features are the State Capitol, the High School, Y. M. C. A., and Federal buildings, Broadwater Hot Springs, and Fort William Henry Harrison. Places of scenic interest in the vicinity are Mounts Helena and Ascension, Last Chance Gulch, Ten Mile Cañon, Lakes Sewall and Hauser, and Prickly Pear Cañon. Under the general code provision passed in 1895, the city government is vested in a mayor, elected biennially, and a unicameral council, which confirms the executive's nominations to all subordinate offices except those of police magistrate and city treasurer, which are filled by popular election. The water works are owned by the city. Pop., 1900, 10,770; 1910, 12,515; 1914 (U. S. est.), 13,258.

HELENA (Lat., from Gk. Ἑλένη, *Helenē*). The name of several saints of the Catholic church, the most celebrated of whom is the Empress Helena, wife of Constantius Chlorus, and mother of Constantine the Great. She was born probably in Dardania, about 248, became concubine to Constantius and bore him Constantine about 274, when she became his wife; but in 292, when he became Cæsar, Constantius divorced her so that he might marry another. In 306 Constantine succeeded his father, and it is likely recalled his mother to the court. It is also probable that late in life Helena became a Christian through Constantine's influence and won the gratitude of the Christian community by her zeal for the advancement of religion and her acts of piety and munificence. Among the public events of her Christian life the most remarkable is the discovery (according to the belief of the church) of the cross of the Lord during the memorable visit she made to the Holy Land, after 326. (See CROSS, INVENTION OF; HOLY SEPULCHRE.) The church said to have been built by her at Bethlehem still stands. She died in the year 328, or later. Her day is celebrated by the Latin church on August 18, by the Greeks on May 21. Other saints of the same name are Olga, wife of the Grand Prince Igor of Kiev (died 969), who is honored in the Russian church; and Helena of Skövde, Sweden, who suffered martyrdom in the twelfth century.

HELENA. A fantastic tragedy by Euripides (412 B.C.), founded on the story that the real Helen never was at Troy, but was represented there by a phantom, while she was carried to Egypt by the gods. There she was found by Menelaus after the Trojan War and rescued from the Egyptian King, and the phantom Helen vanished.

HELENA. 1. The leading character in Shakespeare's *All's Well that Ends Well*, in love with Bertram, who leaves her on their wedding day. 2. An Athenian lady, enamored of Demetrius, in Shakespeare's *Midsummer Night's Dream*.

HELENA, THE. A name given in Germany to Act iii, part ii of Goethe's *Faust*, which was begun in 1800 and published separately in 1827, under the title *Helena: A Classic-Romantic Phantasmagoria*. It is a complete allegorical poem in itself and only slightly connected with the action of the drama.

HÉLÈNE, a'lân', LOUISE ELISABETH. See ORLÉANS, HÉLÈNE LOUISE ELISABETH.

HELENIUS A'CRO. A Roman grammarian and commentator of the second century A.D. He wrote commentaries on some of the plays of Terence (q.v.), and on Horace; the latter were used by Porphyryon (q.v.). Certain scholia or comments on Horace, still extant, whose author is in reality unknown, were wrongly ascribed in fifteenth-century manuscripts to Aéro. These scholia have been most recently collected in O. Keller, *Pseudoacroms Scholia in Horatium Vetusiora* (2 vols., Leipzig, 1902-04). Consult Teuffel, *Geschichte der Römischen*, § 365a (6th ed., Leipzig, 1913).

HELENSBURGH, hel'enz-bür'ū. A favorite watering place in Dumbarton, Scotland, on the right bank of the Firth of Clyde, opposite Greenock, from which it is 4 miles distant (Map: Scotland, D 3). The town is entirely modern, dating from 1802, and is laid out with all the regularity of an American city. Pop., 1911, 8529.

HEL'ENUS (Lat., from Gk. Ἑλένος, *Helenos*). The one son of Priam to survive the siege of Troy. After the death of Paris, he vainly wooed Helen and either withdrew to Mount Ida, where at the instance of Calchas he was captured by Odysseus, or deserted to the Greeks outright. He was the twin brother of Cassandra and, like her, gifted with prophecy. He declared that Troy could not be subdued without Neoptolemus and Philoctetes, and his was the suggestion that the Greeks steal the Palladium and build the wooden horse. Having been assigned, along with Andromache, to the share of Neoptolemus, he won this Prince's good will by foretelling the tempest which the embarking Greeks should encounter and by dissuading him from starting. He was taken to Phthia, but advised his master to settle in Epirus. Grateful for his fidelity, Neoptolemus bestowed upon him Andromache, by whom he had a son, Cestrinus. After the death of Neoptolemus, Helenus ruled over a part of Epirus, which he called Chaonia. There he welcomed Æneas (Vergil, *Æneid*, iii, 294-490).

HELFERT, hel'fêrt, ALEXANDER JOSEF, BARON (1820-1910). An Austrian author and politician, born at Prague, where his father, an ecclesiastical historian, was professor. After serving as assistant to his father and as instructor at the University of Cracow, he was elected to the Austrian Parliament of 1848. He soon became connected with the Ministry of Education, of which (1860-61) he was provisional head, and then was made head of the educational bureau in the Ministry of State, and president of the Imperial Commission on Art and Archaeology. He became prominent as leader of the Clerical Federalist party in the Austrian House of Peers, which he entered in 1881. He was editor of the *Oesterreichisches Jahrbuch* (1885 et seq.) and author of many historical works, of which the following may be mentioned: *Huss und Hieronymus* (1853); *Die Schlacht bei Kulm, 1813* (1863); *Geschichte Oesterreichs vom Ausgange des Wiener Oktoberaufstandes 1848* (1869-86); *Maria Luise* (1873); *Die Wiener Journalistik im Jahre 1848* (1877); *Joachim Murat* (1878); *Fabrizio Ruffo* (1882); *1814: Ausgang der französischen Herrschaft in Oberitalien* (1890); *Gregor XVI und Pius IX* (1896); *Kaiser Franz I und die Stiftung des lombardo-venetianischen Königreichs* (1901); *Aufzeichnungen und Erinnerungen aus jungen Jahren* (1904); *Die Tyroler Landesvertheidigung im Jahr 1848* (1904).

HELGESEN, hēl'gē-sēn, Povl (c.1480-?). A Danish humanist, born at Varberg in Halland. He studied in the monasteries at Varberg and Elsinore and became a Carmelite monk. As lector at the University of Copenhagen, he taught the future leaders of the Danish Reformation, and though forced to flee to Jutland because of his opposition to Christian II, in 1523 he returned under Frederick I. He denounced the sins of the clergy, but, when Luther appeared, he opposed him as a revolutionist. Becoming provincial of the Carmelite Order for Scandinavia, in 1530-33 he engaged in a series of polemics with Hans Tausen, the Protestant leader; in 1534 his attempt to reconcile the two different confessions succeeded only in offending both Catholics and Protestants. His ideal was to bring about reformation within the Church. Of considerable repute as a historian, he published *Danmark's Kongers Historie* and *Skibby Krøniken*. Consult Ludwig Schmitt, *Der Karmeliter Paulus Helid* (Freiburg, 1893).

HELGOLAND, hēl'gō-lānt, or **HELIGOLAND**. A small German island in the North Sea, situated about 35 miles off the western coast of Schleswig-Holstein, in lat. 54° 10' N. and long. 7° 53' E. (Map: Germany, B 1). It covers only a little over one-fifth of a square mile. A few centuries ago the island had five times its present area, but the sea was fast consuming it, when a sea wall, 25 feet high, of steel, granite, and concrete, costing \$30,000,000, was built for its protection, being completed in 1910. Other work for protection and harbor purposes cost about \$8,000,000, and it now affords accommodation for the German high-sea fleet. It holds a commanding position over the entrance to the Kiel Canal and has been heavily fortified, being known as the "Gibraltar of the North Sea." The island played an important part in the naval operations during the War of 1914. (See under WAR IN EUROPE.) Helgoland has two good ports, one on its northern and another on its southern side. The inhabitants are supported chiefly by fishing and commerce, by serving as pilots, and by catering to the needs of the strangers who come for sea bathing. A lighthouse stands on the cliff near the village. Pop., 3000. The natives are of Frisian origin and speak a Frisian dialect, although German is the official language. Helgoland was anciently sacred to the goddess Hertha, and was known as Fosetisland, from the Frisian goddess Foseta, who had a temple on the island. From the middle of the tenth century it was an independent republic, but came into the possession of the dukes of Schleswig in the fourteenth century and was captured in the beginning of the eighteenth century by Denmark. In 1807 it was occupied by Great Britain, to whom it was officially ceded by Denmark in 1814. By treaty between England and Germany the island became a German possession in 1890.

HELIACAL RISING (from Lat. *heliacus*, Gk. *ἡλιακός*, *hēliakos*, pertaining to the sun, from *ἥλιος*, *hēlios*, sun; connected with Lat. *sol*, Goth. *sauil*, AS., Icel. *sól*, Ir. *sul*, Lith., Lett., OPruss. *sauls*, Skt. *sūra*, *svar*, sun). A star is said to rise heliacally when it rises just before the sun. When the sun approaches a star which is near the ecliptic, the star becomes for a season invisible—the heavens being too bright in the quarters of sunrise and sunset, at the time of its rising and setting, to allow it to be seen.

But when the sun, progressing in its apparent orbit, separates from the star, and the latter begins to rise first, it in time rises so much earlier than the sun as just to be visible before daylight. The heliacal risings of various bright stars, such as Sirius, were used by the ancients to mark definite dates in the year. See CANICULA.

HELIADÉ-RADULESCU, ĕl'ī-ad-rā'du-lē'skōō, JOAN (1802-72). A Rumanian author, called the "father of modern Rumanian literature." He was born at Targovistea, and was educated under Lazar at St. Sava until this school was closed by the government in 1821. Then he went to Bucharest, as professor and publisher; founded the *Curierul Românesc* (1829-48) and the *Curierul de Ambe Seve* (1836-44), the earliest Wallachian literary periodicals, and busied himself with almost endless translations—of the Bible, Dante, Tasso, Molière, Ossian, Byron, and Lamartine. In 1828 he published a *Grammar* in which he simplified the Cyrillic orthography. He took so active a part in the revolution of 1848 that he became a member of the provisional government and in consequence was banished when the Russians and Turks overthrew the government. He returned to Bucharest with Omer Pasha in 1854. In his later years he lost much of his national influence and became insane shortly before his death. He wrote: *Paralelismul între dialectele române și italiene* (1841); *Souvenirs et impressions d'un proscrit* (1850); *Le protectorat du Czar* (1850); and a *Mémoire sur l'histoire de la régénération roumaine* (1851); an heroic drama, *Mircea* (1844), and many other plays; a national epic, *Mihaila* (1846); and *Cursul de poezie generală* (1868 et seq.). He was very fond of coining words from the Latin and Italian.

HELI'ADES, or **HELI'ADĒ** (Lat., from Gk. *Ἡλιάδης*). The daughters of Helios and the Oceanid Clymene. They made ready the sun chariot for their brother Phaëthon without the command of Helios and at his death were changed into poplars, while their tears became amber. Some accounts name three Heliades—*Ægle*, *Phaëthusa*, and *Lampetië*; others mention seven. Consult Ovid, *Metamorphoses*, ii, 1-366.

HELLĒ'A (Lat., from Gk. *ἡλία*, *hēliaia*). A higher court at Athens, composed of 6000 citizens over 30 years of age chosen by lot annually, and including a panel of 1000 jurors held in reserve. It was usually divided into 10 sections, each of which constituted a court by itself. See DICAST.

HELIAND, hē'lē-and (OS. *Hēliand*, Saviour). A Saxon poem of the ninth century. The portion still preserved relates the life of Christ as told by the four Evangelists, whose various narratives the author seeks to harmonize. It is thought to have been composed by a Saxon writer of unknown name at the request of the Emperor Louis the Pious and to have contained when complete about 6000 lines. Fragments of the poem have been found in four different manuscripts. Like all early Germanic poems, the *Heliand* is written in alliterative verse, in the use of which the author shows marked skill. Until the publication by Zangemeister and Braune in 1894 of fragments of a Saxon paraphrase of Genesis, the *Heliand* was the only important monument of Saxon known to the present age. Apart from its great value to the student of language, the *Heliand* is of interest

because of its spirited and sympathetic treatment of the gospel narrative. The author shows himself to be no mere slavish transcriber, but a true poet. In accordance with the taste and knowledge of the age, scenes and incidents are strongly localized, the spirit of the whole work being Germanic rather than Christian. To modern readers the intense reality of the characterization often seems irreverent, suggesting the later treatment of biblical narratives in the religious drama; but the purpose of the poet is evidently earnest and extremely reverent. It is doubtful whether an historically correct treatment of the New Testament would have appealed to the primitive audience for whom the poem was composed. The most recent and the fullest edition of the *Heliant* is that of Piper, the first volume of which, containing the text, appeared in 1897. There are German translations by E. Behringer (1898) and Trautmann, in *Bonner Beiträge zur Anglistik* (1905). Consult: Behagel, *Heliant und Genesis* (2d ed., Halle, 1903); Bruckner, *Der Heliantdichter* (Basel, 1904); Löffler, *Das Passiv bei Otfried und im Heliant* (Tübingen, 1905); Martin, *Der Versbau des Heliant und der altsächsischen Genesis* (Strassburg, 1907); Kunze, *Die Bindung von Haupt- und Nebensatz im Heliant und der altsächsischen Genesis* (Leipzig, 1911).

HELIANTHIN, hē'li-ān'thīn. See COAL-TAR COLORS.

HELIANTHUS. See ARTICHOKE, JERUSALEM; SUNFLOWER.

HELIAS, HELIS, or **HELYAS**, hē'lē-ās. See SWAN, KNIGHT OF THE.

HELICE, hē'l'i-sē (Lat., from Gk. Ἑλική, *Helikē*). 1. In Greek mythology, the daughter of Lycæon, beloved by Zeus and transformed by Hera into a bear. Zeus thereupon placed her in the heavens as the constellation of the Great Bear. 2. The daughter of Selinus and wife of Ion. She gave her name to the town of Helice in Achæa, on the shore of the Corinthian Gulf. This city had a famous temple of Poseidon. It was also a gathering place of the early Ionians. In 373 B.C. it was completely destroyed by an influx of the sea, due to a violent earthquake (Pausanias, vii, 24).

HELICIDÆ, hē-lis'i-dē (Neo-Lat. nom. pl., from Lat. *heliæ*, Gk. ἑλῆξ, *hēlēx*, spiral). A large cosmopolitan family of terrestrial pulmonate gastropod mollusks, the land snails. They have a part of the mantle cavity formed into an air-breathing organ, or lung, and the shell coiled. See SNAIL.

HELICOCERAS, hē'l'i-kōs'ēr-as (Neo-Lat., from Gk. ἑλῆξ, *hēlēx*, spiral + κέρας, *keras*, horn). A curious fossil ammonoid shell found in Cretaceous rocks of Europe, Asia, and America, characterized by the looseness of the turreted shell, the last coil of which is of irregular curvature. It is one of the peculiar aberrant forms evolved in the last stages of a race that began in Jurassic time with closely wound discoid shells of the normal ammonoid form. See AMMONOIDEA; CEPHALOPODA.

HELICON, hē'l'i-kōn (Gk. ἑλικών, *hēlikōn*, musical instrument with nine strings, from ἑλῆξ, *hēlēx*, spiral, from ἑλίσσειν, *hēlissein*, to turn; connected with Lat. *volvère*, to turn, Eng. *wallow*). 1. An ancient stringed instrument for illustrating the theory of musical intervals. 2. The lowest of all brass instruments, a form of the tuba (q.v.). It is constructed in various pitches (F, E♭, C, B♭). The helicon is built

in the form of a circle carried around the body, terminating in a wide bell. For this reason it is much used in military bands, because it can be carried with less effort in marching.

HELICON (Lat., from Gk. Ἑλικῶν, *Hēlikōn*). A mountain range in the southwest of Bœotia in Greece, forming a continuation of the range of Parnassus. The loftiest summit (now called Palæovouno) is 5738 feet high. At the foot of Helicon stood the village of Ascra, now Pyrgaki, the native place of Hesiod (q.v.) and the seat of an early school of didactic epic. The mountain was the seat of a very ancient worship of the Muses, and with this is probably to be connected the poetic school at Ascra. The grove of the Muses was at the northern foot of Helicon, in a valley near the monastery of St. Nicholas; higher up the mountain (20 stadia according to Pausanias, ix) was the fountain of Hippocrene (q.v.), probably the modern Kryopegadi, or cold spring. Near Ascra was the celebrated fountain of Aganippe. Consult Baedeker, *Greece* (4th Eng. ed., Leipzig, 1909).

HELICONIDÆ. A family of butterflies noted in the study of mimicry. See MIMICRY.

HELIGOLAND. See HELGOLAND.

HELIOCENTRIC (from Gk. ἥλιος, *hēlios*, sun + κέντρον, *kentron*, centre). A term in astronomy, signifying that the sun is taken as the centre of reference or view. It is opposed to geocentric (q.v.), which indicates that the earth is taken for centre.

HELIODORUS (Lat., from Gk. Ἡλιόδωρος). A Greek romance writer, born at Emesa in Syria. He flourished probably at the end of the third century A.D. and is not to be confused with Heliodorus, the Bishop of Trikka in Thessaly, who, according to the Church historian Socrates, wrote a romance in his youth. His work, in 10 books, entitled *Æthiopica* (Ἀιθιοπικά), narrates the loves of Theagenes and Chariclea (q.v.). At times the work shows almost epic beauty and simplicity. The descriptions are excellent, and the interest of the reader is in general well maintained; but in the presentation of the emotions the work is far less successful. The language betrays the Semitic origin of the author, and the style shows his rhetorical training and adherence to the Neo-Pythagorean school. Heliodorus was strongly influenced by Homer and Euripides and in his turn has been a favorite model of many French dramatists—e.g., of Racine (q.v.). He influenced also Tasso and Cervantes. The romance was translated into many languages. There are editions by Bekker (Leipzig, 1855) and Hirschig (Paris, 1856); English translations by Rowland Smith (London, 1855) and Underdowne (1857; last printed, London, 1895). Consult: Rohde, *Der griechische Roman* (Leipzig, 1900); Oefftering, *Heliodorus und seine Bedeutung für die Literatur* (Berlin, 1901); Wolff, *The Greek Romances in Elizabethan Prose Fiction* (New York, 1912).

HELIODORUS, treasurer of Seleucus IV of Syria (187–175 B.C.). Seleucus sent him to Jerusalem to rob the temple, but he was refused admittance by Onias, the high priest, on the first day, and on the next was driven away, according to the story (2 Macc. iii), by a terrible angel. He murdered his master and usurped the throne, from which he was driven by Attalus and Eumenes, princes of Pergamus, after a few months.

HELIOGABALUS. See ELAGABALUS.

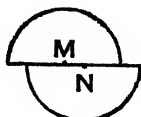
HELIOGRAPH, hē'l'i-ō-grāf (from Gk. ἥλιος,

hēlios, sun + *γραφία*, *graphia*, writing, from *γράφειν*, *graphein*, to write). An instrument used for communication between distant stations by reflections of the sun from a mirror or system of mirrors. The great advantage of this method over the ordinary signal system, where flags, semaphores, or other visual signals are employed, is that the apparatus is more portable and can be used over greater distances, but only with success in regions where the atmosphere is clear of clouds for considerable periods of time. There are two methods of using the heliograph, which are based in the main on the dot and dash of the Morse alphabet or code: the reflection may be obscured except when the screen is temporarily removed to produce a flash or letter; or the reflection may be kept exposed except when it is obscured to produce a letter. The first method is said to be the easier for the beginner, but the second less fatiguing to the eye. The distance through which this mode of communication may be carried on varies with the size of the mirrors and the clearness of the atmosphere. In 1890 messages were signaled along the Arizona mountains for 215 miles. When the signaling station forms an angle greater than a right angle between the sun and the receiving station, two mirrors are used to prevent too great a loss of rays by oblique reflection. The mirrors are mounted on tripods and are held by a socket, or a universal joint. The heliograph has served also to define distant points in a geodetic survey and for this purpose has been employed in triangulation. When so used, it is called a heliotrope. Perhaps the chief use of the heliograph is in military operations in the field. It formed the sole means of communication between the besieged British garrisons and the relief columns during the Boer-British War. See SIGNALING, MILITARY.

HELIOGRAPHY. See PHOTOGRAPHY.

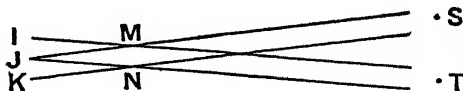
HELIOLITES, *hē'li-ō-lī'tēz* (Neo-Lat., from Gk. *ἥλιος*, *hēlios*, sun + *λίθος*, *lithos*, stone). A genus of fossil alcyonarian corals found in Ordovician and Silurian rocks and less abundantly in the Devonian formations. Heliolites is the type of an important family, Heliolitidae, comprising about 10 genera and 45 species. All the members of the family have rounded coral masses that consist of larger tubes surrounded by smaller tubes. The genera and species are based upon modifications of the horizontal and vertical walls that traverse the interior of the mass. They have been found in all countries where Silurian and Lower Devonian formations exist, and they often form fossil coral reefs of considerable extent. *Heliolites interstinctus*, the best-known species, is of world-wide distribution. Consult Lindström, "Remarks on the Heliolitidae," in *Kongliga Svenska Vetenskaps-Akademiens Handlingar*, vol. xxxii (Stockholm, 1899). See CORAL; OCTOCORALLA.

HELIO-METER (from Gk. *ἥλιος*, *hēlios*, sun + *μέτρον*, *metron*, measure). An instrument



originally intended for measuring the angular diameter of the sun. It is an equatorially mounted telescope in which the object glass is

divided diametrically, the two halves so arranged that they can be made to slide past each other in opposite directions (as shown in the figure) by means of a graduated screw. Each half will form a perfect image in the focus of the eyepiece; and the images may be made to diverge, coincide, or overlap each other by varying the distance between the centres of the half lenses. If the diameter of the sun is to be measured, the two lenses are adjusted so that the images of the sun will touch each other, then the distance between the centres of the two object glasses measured in seconds gives the diameter of the sun. The following diagram will serve to make this clear: *M*, *N*, are the optical centres of the two halves of the object glass; *S*, *T*, the ends of a solar diameter. When the



distance between *M* and *N* is properly adjusted, the image of *S* due to the lens *M* and that of *T* due to the lens *N* will coincide at *J*; *I* is the image of *T* due to the lens *M*, and *K* that of *S* due to the lens *N*. Since *S* and *T* are infinitely distant, the lines *IM*, *JN* and *JM*, *KN* may be regarded as parallel pairs, and consequently *MJN* is the angle subtended at *J* by *ST*, i.e., the sun's angular diameter. It is therefore only necessary to know the angular value of the graduations of the screw in order to be able to obtain the angular diameter of the sun. When it is required to measure the distance between two stars, the line of division of the object glass must first be brought into coincidence with the line joining the stars, and for this purpose the telescope must be mounted so that it can be turned about its own axis.

The original idea of the heliometer was due to Savary (1743) and Bouguer (1748), who made use of two object glasses, one of which could be displaced with reference to the other. Dollond in 1758 showed how a simpler arrangement could be obtained by cutting the object glass into two halves; but the first really available instrument was constructed by Fraunhofer for the observatory at Königsberg, and was mounted there in 1820, three years after his death. The perfected type of instrument as used to-day is the work of A. Repsold and Sons of Hamburg. The original use of the heliometer has been greatly extended, especially in the hands of Gill at the Cape of Good Hope Observatory. As now made, angular distances above two degrees can be measured on the sky with extreme precision. On the whole, the modern heliometer is considered the most precise measuring instrument known to astronomy.

HELIOPHOBES, *hē'li-ō-fōbz* (from Gk. *ἥλιος*, *hēlios*, sun + *φόβος*, *phobos*, fear). A term applied to plants that are supposed to dislike or avoid the sunlight. It is equivalent in most instances to the more desirable designation "shade plants," that carries with it no implication of purpose on the part of the plant.

HELIOPHYLLUM (Neo-Lat., from Gk. *ἥλιος*, *hēlios*, sun + *φύλλον*, *phyllon*, leaf). A fossil coral very common in the Hamilton shales of central and western New York and other localities in America. This coral is usually simple, of conical form, with a large shallow cup in which a great number of slender septa,

or walls, radiate from the centre towards the elevated edge. Perfect specimens, which are quite common, are really beautiful objects. Sometimes the coral branches, and then two or more cups or calyces are found on the same stem. *Heliophyllum halli* is the common species.

HELIOPOLIS (Lat., from Gk. Ἡλίου πόλις, *Hēliou polis*, city of the sun). The Greek name of the ancient Egyptian city On, situated on the east side of the Pelusiac branch of the Nile near the apex of the delta. Its site is occupied by the modern village of Matariah. Heliopolis was the seat of worship of the god Tum, or Atum, who later came to be regarded as one of the forms of the sun god Rē. Its sacred name was Per-Rē (house or city of Rē), and of this the Greek name is a translation, as was also the Hebrew name *Bethshemesh*. As On, it is often mentioned in the Bible. Although a very ancient and important city—according to Manetho, it existed in the time of the second dynasty—it is seldom mentioned in Egyptian texts before the twelfth dynasty. Amenemhat I built here a splendid temple, on the site of an older sanctuary, and his son and successor, Usertesen I, erected before it two great obelisks, of which one is still standing. The obelisks known as Cleopatra's Needles, of which one is now in New York and the other in London, were originally erected at Heliopolis by Thothmes III. Under Ramesses III (about 1200 B.C.) the temple was at the height of its influence, standing second only to that of Ammon at Thebes; 12,093 persons are said to have been engaged in its service. The theological school of Heliopolis had a strong influence upon Egyptian religious thought, and to it is due a very considerable portion of the religious literature of ancient Egypt. Greek writers mention the great reputation for wisdom enjoyed by the Heliopolitan priests, and Thales, Solon, and Plato are said to have studied under them. Under the later dynasties Heliopolis seems to have declined, since Herodotus speaks only of the wisdom of its priests, not of the splendor of its buildings; and Strabo, at the beginning of the Christian era, states that the place was practically deserted, though the temple and college still existed. The ruins of the city and temple existed in a fair state of preservation far down into Arab times, but now little remains except the obelisk of Usertesen I.

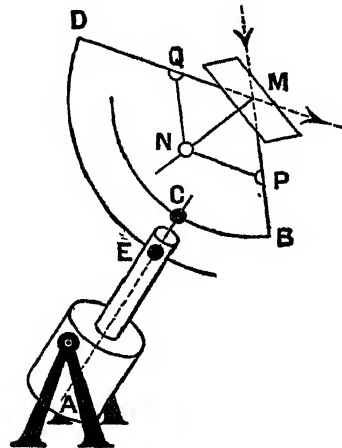
HELIOPOLIS, IN SYRIA. See BAALBEK.

HELIOS (Gk. Ἥλιος, or, in the epic, Ἡέλιος, *Hēlios*; connected with Lat. *sol*, Goth. *sauil*, AS., Icel. *sól*, Ir. *sul*, Lith., Lett., OPruss. *saule*, Skt. *sūra*, *svar*, sun). The Greek name of the sun god. He was, according to Hesiod's *Theogony*, a son of the Titan Hyperion and of Thea or Euryphaessa, and is described by the same poet as giving light to both gods and men. He rose in the east from the marshy borders of Oceanus, into whose dark abysses he also sank at evening. The later poets, however, gave him a splendid palace in the east, somewhere beyond Colchis, and described him as being conveyed back to Colchis, after the termination of the burning labors of the day, in a winged boat of gold, along the northern coasts of the sea. In the earlier poets Helios is a distinct personality, all-seeing, the possessor of herds on Trinacria, a powerful deity. Later, much of his personality is obscured, and the real sun god becomes Apollo, probably because the word "Helios," denoting also the actual sun, was not felt so fully as a proper name. Euripides contributes much to

this fusion. The worship of Helios was widely spread. He had temples in Corinth, Argos, Trozene, Elis, and many other cities; but his principal seat was Rhodes, where four white horses were annually sacrificed to him. A similar sacrifice was offered in his honor on the summit of Mount Taygetus in Laconia. In art he was represented as a young man in the full vigor of his strength and beauty, with flowing hair, and a crown of rays. Often he was represented in his four-horse chariot, as in a celebrated group by Lysippus at Rhodes. Consult Fairbanks, *The Mythology of Greece and Rome* (New York, 1907), and the article "Helios," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HELIOSTAT (from Gk. ἥλιος, *hēlios*, sun + στατός, *statos*, fixed; from ἑστάναι, *hestanai*, to stand). An instrument used in astronomy, physics, and engineering to reflect the light from the sun in any desired direction notwithstanding the motion of the sun. It consists essentially of a mirror mounted on an axis, which is parallel to the axis of the earth and is caused to turn by clockwork with the same angular velocity as that of the sun. The first instrument of this kind was described by s'Gravesande (1688-1742) in his *Physices Elementa* (3d ed., 1742).

Various improved forms were invented by Fahrenheit, Biot, Foucault, Silbermann, and others. In Fahrenheit's heliostat a plane mirror is rigidly connected with the revolving axis in such a way that the angle between the normal to the mirror and the axis is equal to half the sun's polar distance. The normal is then adjusted so as to have the same right ascension as the sun, with the result that the mirror will constantly reflect the sun's rays in the direction of the earth's axis; a second fixed mirror is then used to reflect the rays in the desired direction. The use of the second mirror is unnecessary with Silbermann's heliostat, the principle of which may be illustrated by the accompanying diagram: *AM* is the axis of revolution, and *MB* a



rod which can be clamped to the axis in any position by means of an adjustable quadrant *BC*. *MPNQ* is a small rhombus of jointed rods, *M*, *P*, and *Q* being fixed joints, while *N* can slide in a slot on the rod *MN*, which is normal to the mirror and rigidly connected with it. By means of a couple of sights, *MB* is set so as to coincide with the direction of the sun's rays; *MD* is set in the direction in which it is desired to reflect

the rays, and is clamped at *E* to the fixed sleeve in which the axis revolves. The joints, *M*, *P*, and *Q*, must be of such a nature that the rhombus is free to adjust itself as *MB* revolves towards *MD*. Since the angles *NMP* and *NMQ* are always equal, it is easy to see that the incident beam will be reflected constantly in the desired direction. The heliostat is used with the spectroscopic (q.v.), where it is desired to keep the sun's rays on the slit or in connection with a permanently mounted horizontal telescope. A telescope of large size and long focal length, especially for spectrographic work (see TELESCOPE), it would be most difficult to mount equatorially, and accordingly it is necessary to reflect the light from the heavenly objects under observation into its object glass. The heliostat has also been used for observing eclipses, especially where it is desired to photograph the eclipse or make extensive spectroscopic observations. The term "heliostat" is also used to name an instrument which is more usually known as the *heliotrope*, used by surveyors and engineers in making long-distance observations for distant stations. This consists of a mirror at the distant station which is so mounted and adjusted that it will reflect a beam of light to the observing station. The heliostat of Thomas Drummond was an instrument of this kind and was employed in geodetic surveying in England with considerable success.

HELIOTAXIS (Neo-Lat., from Gk. *ἥλιος*, *helios*, sun + *τάξις*, *taxis*, arrangement). Same as phototaxis (q.v.). See also HELIOTROPISM; TROPISM.

HELIO THERAPY, *hē'li-ō-thēr'a-pī*. A system of treatment consisting in prolonged exposure of the naked body to the solar rays. While the healing virtues of sunlight have probably always been recognized, their systematic employment in the treatment of specific diseases and in graduated doses is a comparatively recent practice. The credit of first using sunlight in this way is generally assigned to Professor Poncet of the Lyonnaise school.

It is interesting to note that as far back as 1857 Madame Duhamel, who cared for tuberculous children at Berck, had them taken twice a day to the beach, and, after bathing them and washing their open sores, exposed them nearly naked to the air, believing that this, with the sunlight, would hasten the cure. Professor Poncet's experiments began about the end of the 19th century; but he, with others of the same school, exposed only the diseased portions of the body which they desired to treat.

Rollier was the first to expose the entire body. At his sanatorium in Leysin, in the Swiss Alps, 4000 feet above sea level, tuberculous patients are treated in the following manner. New patients are put to bed for a few days, to insure acclimatization. After two or three days the bed is wheeled out on a gallery, and the sunlight exposures begin, the diseased focus being exposed for five minutes three times the first day, ten minutes the second, until the patient is getting sunlight exposure for an hour and a half daily. At the same time the body is gradually exposed to the sunlight, at first the feet, then the legs, until the patients are able to remain all day in the open and take sun baths for hours at a time. During the intervals the wounds are covered with an aseptic dressing. Each patient has a gallery to himself, where he can lie exposed to the light during the day and sleep at night also if he wishes. Colds are unknown.

Children are allowed to be up and around in winter with snowshoes and bathing trunks for their sole apparel.

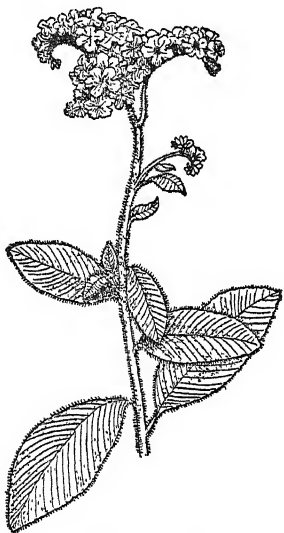
The transformation of the subjects under the solar rays is characteristic. Completely exposed to the sun and sheltered from the wind, with head protected by a wide hat and the eyes screened by means of smoked glasses, pigmentation of the skin is very rapid; at the end of a month or two brunettes take the color of rosewood and actually look like negroes, blondes become mahogany-colored, the general aspect is modified, and becomes blooming, the muscles are regenerated, the digestive functions are regular. Of the diseases benefited by this form of treatment, all forms of surgical tuberculosis show the greatest improvement. All varieties of external tuberculosis, tubercular peritonitis, tuberculosis of the eyes, muscular rheumatism, infected wounds, and many chronic skin diseases are cured.

Collet treated patients suffering from laryngeal tuberculosis by heliotherapy in a most ingenious manner. The patient, wearing a broad black hat and black spectacles, sits facing the sun, and by means of a laryngoscopic mirror placed in the throat and a hand glass in front of him directs the rays of sunlight into the larynx. This procedure is repeated at intervals during the day until a total exposure of an hour or more is attained.

Kime, of the Boulder Sanatorium, at Fort Dodge, Iowa, investigated the effect upon the skin of the chemical rays obtained by filtering sunlight through various media. Direct sunlight produces erythema solare (sunburn), marked by extreme redness, swelling, and great tenderness, with subsequent peeling of the skin. There is some tendency to the formation of blisters. Sunlight, concentrated by large reflecting mirrors and passed through blue glasses, thus securing the maximum effects of the chemical rays, shows a great tendency to blister, but there is little redness and swelling and practically no pain. Focusing direct sunlight through a convex lens of plain glass produces destruction of the skin, and, if used with great intensity, gases form beneath the outer layers of the skin, and small explosions occur. This method of using sunlight is very efficacious in the removal of warts, superficial moles, and small nonmalignant growths. If the light be reflected by a concave mirror and focused, the formation of gases is not noted. If, after the light is focused in either of the two ways last mentioned, it is passed through blue glass before falling on the skin, blistering is produced without destruction of the deeper layers of the skin. When a wavy, opalescent glass is employed and the sunlight is reflected with a large condensing mirror, 10 feet in diameter, and passed through this opalescent glass, neither blistering nor destruction of the skin takes place, but blanching of the tissues occurs. The light used in this manner is very effective in lupus and in vascular naevi, even of very large extent. Just what the properties of the light may be that effect these various results has not been determined. It would appear, however, that some of the rays are absorbed by the reflecting mirror and others by the variously colored glasses. The wavy glass transmits the light in an irregular manner and produces results widely different and more effective, in the class of cases mentioned, than the glass with an even surface. See PHOTOTHERAPY.

HELIOTROPE. See SURVEYING INSTRUMENTS; HELIOGRAPH; HELIOSTAT.

HELIOTROPE (from Lat. *heliotropum*, Gk. ἡλιοτρόπιον, *hēliotropion*, heliotrope, sundial, from ἥλιος, *hēlios*, sun + τροπή, *tropē*, a turning, from τρέπειν, *trepein*, to turn), *Heliotropium*. A genus of plants of the family Boraginaceæ (q.v.). Many of the species have fragrant flowers which are used by perfumers. The Peruvian heliotrope (*Heliotropium peruvianum*), a small shrub, seldom more than 2 feet high, with oblong-lanceolate wrinkled leaves and small lilac-blue flowers, is in almost universal cultivation for its fragrance, which resembles that of vanilla. The European or common heliotrope (*Heliotropium europæum*), a native of the south and west of Europe, is an annual with small white, or rarely pale-red, flowers. A white-flowered species (*Heliotropium curassavicum*) grows wild in



HELIOTROPE.

the southern United States. *Heliotropium corymbosum* is a large-trussed, large-flowered, narcissus-scented species. Many hybrid heliotropes are now to be seen in flower gardens and greenhouses, which exhibit great variety in the size and color of their flowers. They delight in a light, rich soil. The shrubby kinds are generally propagated by cuttings.

HELIOTROPE, or BLOODSTONE. A variety of chalcedony of a green color, with small spots of red jasper. It is found in Siberia, in the Hebrides on the west coast of Scotland, and in the United States—in Chatham Co., Ga., Orange Co., N. Y., and in Oregon and Colorado. It was known to the ancients, who valued it for gem purposes. During the early ages of the Christian Church it was used for the engraving of sacred subjects, the figures being so arranged that the red spots were made to represent drops of blood. It is sometimes called St. Stephen's stone. It is still frequently used as a seal.

HELIOTROPISM, or PHOTOTROPISM (from Gk. ἥλιος, *hēlios*, sun + τροπή, *tropē*, a turning). The sensitiveness of plant organs to the direction of light rays incident upon them. The organ responds to lateral illumination by bending in such a way as to bring its axis into a certain fixed position with reference to the direction of the rays of light. The main shoots of

most higher plants are positively heliotropic—i.e., they bend so as to direct their axes towards the source of illumination (Fig. 1). Thus, whenever plants are grown in front of a win-

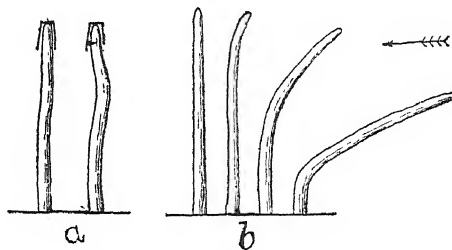


FIG. 1. POSITIVE HELIOTROPISM.

Seedlings of oats grown in darkness *a*, two exposed to light from direction of arrow, but with sensitive tips capped with tin foil, *b*, four, whose tips were not shaded, sketched at intervals as the bending towards the light increased. Growth is accelerated on the side less illuminated.

dow, the stems bend towards the light. Some organs are negatively heliotropic. This is seen best in the case of certain roots (especially those of plants belonging to the mustard family) when grown in water. If such roots are laterally illuminated after having been grown in the dark, they bend away from the light. This distinction between primary roots and stems is only apparent, for primary roots (so far as they are phototropes at all) respond positively to unilateral light of very low intensity, while stems respond negatively if the light be of very high intensity. The difference, then, is in the intensity required to give one or the other response in the two sorts of organs.

Another mode of response to the stimulus of one-sided illumination is known as "diaheliotropism." Most leaves are diaheliotropic; they bend so as to bring their blades into a plane at right angles to the direction of the incident rays, the normally upper side of the leaf always facing the light (Fig. 2). This reaction is well shown by many house plants, such as the geranium (*Pelargonium*), when subjected to one-sided lighting. The form of heliotropic response may be very different when the intensity

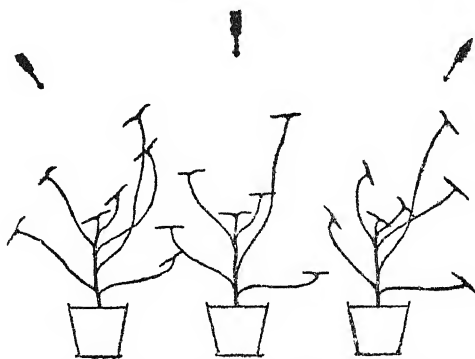


FIG. 2. TRANSVERSE HELIOTROPISM OF LEAVES.

Diagrams showing the plane of the leaves of *Tropæolum* with light successively from the direction of the arrows.

of the illumination varies. Many leaves, when exposed to a light of medium intensity, are diaheliotropic; but when the intensity of the light increases beyond a certain limit, they bend so as to direct their tips either towards or away

from the source of the stimulating rays. They thus present less surface for the light to fall upon. Oxalis leaves show this response on bright summer days. The leaflets fold along the midrib and drop downward as though wilted. Clover (*Trifolium*), the sensitive plant (*Mimosa*), cassia, the bean (*Phaseolus*), and many others exhibit this phenomenon also. The final position assumed by any plant organ is never due, in nature, to the heliotropic response alone, but results from the combined action of many factors, of which light and gravity are the most important. See PHYSIOLOGY OF PLANTS.

For heliotropism in animals, see TROPISM; PHOTOTAXIS.

HELIOZOA (Neo-Lat. nom. pl., from Gk. ἥλιος, *hēlios*, sun + ζῷον, *zōon*, animal). An order of rhizopods, comprising forms naked, or clothed with a siliceous skeleton, and with fine, more or less stiff pseudopodia radiating from all sides. Contraction vacuoles are generally present. They are fresh-water forms and are frequently called sun animalcules. They are sometimes supplied with a stalk and occasionally form colonies, but many of them are free-swimming. They take their food into the body by means of the currents of protoplasm on the pseudopodia. A widespread and familiar species is *Actinophrys sol*.

HELIUM (Neo-Lat., from Gk. ἥλιος, *hēlios*, sun). A gaseous element detected spectroscopically in the solar chromosphere by Janssen in 1868, Janssen's observation being correctly interpreted in the same year by Lockyer and Frankland as the discovery of a new element, which they named helium, the solar element. Among the elements of the earth helium was discovered in 1895 by Ramsay, who found it as the principal constituent of the gaseous mixture given off by the Norwegian mineral cleveite on heating. Later in the same year Kayser discovered spectroscopically its presence in the air, and in 1908 Ramsay showed that 1,000,000 volumes of air contain about four volumes of helium. The element further occurs in the mineral uraninite, from which Hillebrand expelled it in 1889 (without recognizing the gas as a new element); also in fergusonite, brüggerite, and certain other minerals. According to Cady and McFarland, Kansas natural gas contains in some localities nearly 2 per cent of helium; others have found relatively large amounts of helium in the gases from certain mineral springs. How it originated in all these sources, how it is held so firmly occluded in the minerals mentioned above, is not known, and the keenest investigators have not yet succeeded in throwing light on the subject. But by far the most remarkable fact about helium is its *creation* (discovered by Ramsay and Soddy in 1903) from the element radium, and again its *creation* (discovered in 1907) from the radioactive elements actinium and thorium. When, e.g., a radium salt is dissolved in water, a slight evolution of gas sets in, the water being decomposed into hydrogen and oxygen, while the radium salt itself gives a radioactive "emanation" (see NITON); but the latter is not a permanent substance, for in the course of about four days it gradually disappears, helium gas appearing in its place.

Helium (symbol He; atomic weight, 3.99) is a colorless gas, not quite twice as heavy as hydrogen. Chemically it is, as far as known, absolutely inert, no substance being known to

contain helium in chemical combination. Its molecules consist of single atoms, so that its atomic weight is also its molecular weight. In 1909 Kammerlingh Onnes, after many fruitless efforts, succeeded in liquefying the gas, his product being no less than 60 cubic centimeters of pure liquid helium. He found it to be the lightest liquid known, its specific gravity being only 0.122. The critical temperature of helium is 268° below the freezing point of water (i.e., only 5° above the absolute zero of temperature), which explains the difficulty of liquefying it. (See CRITICAL POINT.) Under normal atmospheric pressure liquefied helium boils at 268.5° below 0° C.; but even the great cold produced by its rapid ebullition is not sufficient to freeze it.

The isolation of helium in the pure state is a matter of some difficulty. To begin with, some mineral containing the gas, like cleveite or uraninite, is finely powdered and heated with dilute sulphuric acid, the air being excluded and the expelled gas being collected over mercury. The gas—mostly helium, but containing also nitrogen and other atmospheric constituents—is next transferred into an evacuated vessel partly filled with a mass of charcoal and cooled from the outside with liquid air; the charcoal gradually absorbs everything except the helium and part of the neon (q.v.), and if the process is repeated several times, nothing but pure helium remains behind unabsorbed.

HELIX (Lat., from Gk. ἑλξ, spiral). 1. In geometry, the spiral line described on a regularly revolving cylinder by a point moving parallel to its axis. 2. In architecture, such a line is described when a light of steps winds round a cylindrical space or centre post. The name is also given to the little volutes under the flowers of the Corinthian capital. The *helical* line is the central line of such a helix or spiral. 3. A genus of land snails. Fossil forms are often found in great abundance in both the fresh-water and marine limestones and marls of Tertiary age in America, Europe, Asia, and Africa. See SNAIL, and Colored Plate of SNAILS.

HELL (Icel. *hel*, AS. *hel*, *hell*, OHG. *hella*, Ger. *Hölle*; probably connected with AS., OHG. *helan*, Ger. *hehlen*, to cover, and ultimately with Lat. *celare*, Gk. *καλύπτειν*, *kalyptein*, to hide, OIr. *celim*, I hide; hence, the hidden, unseen place). In common use, the place or state of the wicked after death, or the abode of evil spirits. Among the early Teutons the term signified the place under the earth whither all men, good or bad, went after death, and consequently denoted a conception similar to the Hebrew Sheol (q.v.). There is evidence, however, that already before contact with Christianity this nether world was divided into distinct parts. Thus, in the realm over which the goddess Hel rules there is the blessed place where Balder and Nanna dwell, and also Lif and Lifthraser, who are to become parents of a new and better human race; and there is Nastrand, where the monster Nidhogg feeds upon the bodies of murderers, perjurers, and adulterers. How strongly entrenched the original meaning was is evident from the fact that the early translators of the Bible did not hesitate to use the word as a rendering of Sheol, the pit, or the grave, even in passages where good men are said to descend into these places. Modern translators generally restrict the word to those cases where the original has Gehenna (q.v.) or Tartarus, in harmony with the significance that the term has gradually attained.

The Greek conception of Hades, or the unseen world, as seen in the Homeric poems, is substantially the same as that of the early Teuton. To the animistic origin of the idea the Mycenaean tombs bear testimony. Whatever native tendencies there may have been in the direction of a moral distinction and a differing lot among the shades in Hades, they were greatly strengthened in the seventh and sixth centuries B.C. by the establishment upon Grecian soil of the originally Thracian Orphic cult societies. Those initiated in the Orphic mysteries secured for themselves a blessed immortality, while the uninitiated were liable to severe punishment for their sins in Hades. In a society where the *lex talionis* prevailed, it is natural that the punishment conceived to be inflicted upon men in a future world should be related to the crimes committed, and Greek imagination nicely adjusted the penalty to the sin. Through Pythagoras of Samos in the sixth century B.C., the idea of a transmigration of souls and the necessity of expiating the sins of a past age grafted itself upon the Orphic conceptions. With the expansion of Greek civilization through the conquests of Alexander, Orphic and Pythagorean speculation spread in the East, modifying or transforming many native ideas. As in other Semitic nations, so in ancient Israel, the shadowy existence in Sheol was in marked contrast with existence in the land of the living and could not be called life at all. In Sheol there were no moral distinctions and no rewards for virtue or punishments for crimes. "The wicked ceased from troubling, and the weary were at rest." This attitude towards the future was preserved throughout the Old Testament. There is not a single passage in which Sheol is represented as a place where the wicked are punished. When for the first time the idea of a resurrection is found in the twelfth chapter of the Book of Daniel (written 165 B.C.), the tyrants that are raised to obloquy and shame, as well as the martyrs that rise to life and glory, undoubtedly continue their existence on earth. In an addition to the last chapter of the Book of Isaiah, probably made in the second century B.C. (Isai. 23, 24), it is predicted that the pious Jews who visit the temple in Jerusalem on Sabbaths and other holidays will go out to look with pleasure upon the carcasses of the enemies that are being consumed by fire and worms. Probably the valley of Hinnom (q.v.) is meant. It is significant that this place of punishment has not yet been transferred to the unseen world. There was no allusion to this passage in the original text of Ecclesiastes vii. 17, where the Hebrew has only "the hope of man is the worm." But substantially the same conception of the valley of Hinnom is found in Enoch xxvii. 2, 3, and xc. 24-26. While the growth of the doctrine of Gehenna can be explained from national premises (see HINNOM), the transformation of a Sheol without wide distinctions into a hell where the wicked are punished, seen for the first time in Enoch xxii (towards the end of the second century B.C.), can scarcely be accounted for without resorting to the assumption of foreign influence, Persian or Hellenistic. In this place of punishment some sinners remain, according to the author, even after the general judgment, being neither slain nor raised. The Parables of Enoch (see ENOCH, BOOKS OF) refer to "a deep valley with burning fire" into which the kings and the mighty are cast, and

where there is an "abyss of complete condemnation" and a burning furnace for the hosts of Azazel liii. 1-5. This is evidently Gehenna. In the Slavonic Enoch the prison of the apostate angels is in the second heaven (vii), and the place of the damned in the northern part of the third heaven (x); and in the Testaments of the Twelve Patriarchs the spirits of the lawless are confined in the second heaven. In the Wisdom of Solomon, iii. 10, 14; iv. 10, 19, Hades is practically identical with Gehenna, since the author does not believe in a resurrection. The influence of Orphic-Pythagorean thought is particularly evident in the fullest description of hell preserved from the early Church, the Apocalypse of Peter, where the different punishments are carefully adjusted to the different kinds of sin. Among early Christian writers the word "hell" is variously employed, sometimes to signify a place of temporary purgation, in which sense it comprehends the Roman Catholic purgatory; sometimes the place (*limbus patrum*) in which the souls of the just of the old law awaited the coming of Christ, who was to complete their felicity; sometimes the place in which unbaptized children are believed to be detained, on account of the stain of unremitted original sin; and lastly, the prison of those who die stained with the personal guilt of grievous sin. As to the nature of the punishment to which they are subjected, whether it is confined to the "pain of loss"—i.e., to the remorseful consciousness of having forfeited the presence of God and the happiness of heaven—or whether and to what degree it further includes the "pain of sense," there is some difference between the Eastern and the Western church, and it is sometimes alleged that the Eastern church altogether rejects the idea of punishment of sense. This, however, is a mistake; both churches agree that the punishment of hell includes the "pain of sense," the controversy between them having regarded not the existence of the pain of sense, but certain questions as to its nature, and especially whether it consists of material fire—a point which, in the decree for the union of the Greek and Latin churches at the Council of Florence, was left undecided. The controversy on the subject of the eternity of the punishment of hell dates from an early period, Origen and his school having taught that the punishment was but purgatorial in its object; that, its purifying effect having once been attained, the punishment would cease for all, even for the devils themselves; and that its duration in each case is proportioned to the guilt of the individual. This doctrine of the final restoration of all to the enjoyment of happiness was the well-known Origenistic theory of the *apocatastasis*, to which so many of the early writers refer. It was condemned by the second Council of Constantinople, and a belief in the eternity of the punishments in hell became characteristic of both the Eastern and the Western churches, and from them passed into the creeds of the churches of the Reformation. The more radical thinkers of the Renaissance period rejected the doctrine of hell, and especially many Baptist and anti-Trinitarian churches. In modern times the belief in physical punishment after death has been abandoned by certain Protestants, and the endless duration of this punishment is rejected by many, either on the ground of a future acceptance of Christ after a punishment commensurate with the offenses committed during a

brief lifetime, or for reasons connected with their general interpretation of life. Consult: Söderblom, *La vie future* (Paris, 1901); Dieterich, *Nekyia* (Leipzig, 1893); Charles, *Eschatology* (London, 1890); Bautz, *Die Hölle* (Mayence, 1882); Passaglia, *De Æternitate Panarum deque Igne Inferno* (Regensburg, 1854); Volz, *Jüdische Eschatologie von Daniel bis Akiba* (Tübingen, 1903); Bousset, *Die Religion des Judentums in neutestamentlichen Zeitalter* (2d ed., Berlin, 1906). See ESCHATOLOGY; HEAVEN; INTERMEDIATE STATE; JUDGMENT, FINAL.

HELL, PETER. See HELE, PETER.

HELLA. A town in Asiatic Turkey. See HILLAH.

HELLADOTHEIRIUM (Neo-Lat., from Gk. Ἑλλάς, *Hellas*, Greece + θήρ, *thērion*, dim. of θήρ, *thēr*, wild beast). A fossil giraffe, with hornless skull and legs of nearly equal length, skeletons of which have been found in the Pliocene deposits of Europe, Persia, and India. It is interesting as being allied to the recently discovered okapi. See GIRAFFE.

HELLAND, AMUND THEODOR (1846-). A Norwegian geologist, born at Bergen and educated at the University of Christiania, where he became lecturer in 1874 and professor in 1885. For scientific purposes Helland traveled through almost all European countries, from North Cape to Greece, Italy, and Spain, to north Africa, to Greenland (1875), where he showed the quick movements of the glaciers, to the Orkney, Faroe, and Shetland Islands (1879, with James Geikie), Iceland (1881), and every district of Norway. He wrote many books and a large number of articles on firds, seas, glaciers, ores, volcanoes, and mining. In 1897 he became editor of the great work *Norges Land og Folk* (founded in 1884 by Kjer and others), of which, in 1914, 29 volumes were ready (also Ger. trans.). Besides, he published the important *Haandbog i Grubedrift* (Manual of Mining, 3 vols., 1887) and *Norske Bergret* (1892), and a work on prehistoric Norway, *Oldfundene og Norges Folkemængde i forhistoriske Tider* (1908), which attracted much attention.

HELLANICUS (Lat., from Gk. Ἑλλάνικος, *Hellānikos*) (c.496-c.408 B.C.). One of the Greek logographers (q.v.) of the fifth century B.C., born at Mytilene on the island of Lesbos. Although a contemporary of Herodotus, Hellanicus' attitude was essentially that of the older Ionian logographers rather than that of the historian. He traveled extensively, and the titles of his works show that he had an intimate knowledge of many parts of Greece. He wrote a chronicle based upon the records of the priestesses of Hera at Argos (Ἱέραια αὐτῆς Ἀργεῖ), and another based on the lists of victors at the Carneian games at Sparta (Καρνεονίκαι). He also composed special histories of a number of districts in Greece, such as the Ἀθῆναι (history of Attica), Φορβῶναι (history of Argos), Ἀσωνίαι (history of Boeotia), Ἀρκαδικαί, Ἰολικά, Lesbica, etc., as well as accounts of special events, such as the Trojan War (Τρωικά) and the Persian invasion (Περσικά). He is blamed by Thucydides and subsequent historians for inaccuracy in his chronological statements, but there can be no doubt that his work was employed by Herodotus and later historical writers. He first made progress towards a scientific chronology and, for his sources, went beyond mere tradition to priestly records. All that is preserved of his writings

is given in Müller, *Fragmenta Historicorum Graecorum* (Paris, 1841-70), and in Kullmer, "Hellānikos," in *Jahrbücher für klassische Philologie*, Supplementband xviii (Leipzig, 1902). Consult: Koehler, *Leipziger Studien zur Klassischen Philologie*, xviii (Leipzig, 1898); Lehmann-Haupt, "Hellānikos, Herodot, Thukydides," in *Klio*, vol. vi (ib., 1906); J. B. Bury, *Ancient Greek Historians* (New York, 1909); Christ-Schmid, *Geschichte der griechischen Literatur*, vol. i (5th ed., Munich, 1908).

HELLAS (Lat., from Gk. Ἑλλάς). In the Epos, a district of southern Thessaly, near Phthiotis, with which it is sometimes identified; it was under the rule of Peleus, father of Achilles. As the name Hellenes (Ἕλληνες, or, at first, Παῖες Ἕλληνες) came to be applied to the whole Greek race, so the name "Hellas" was applied to the lands where the Greeks were settled, and, in a more restricted sense, to the mainland of Greece, especially the district north of the Peloponnesus. The Greeks seem to have received the name "Hellenes" as a collective title with the growth of the legend that Hellen (q.v.), son of Deucalion, was the father of the race. Originally it must have meant only the inhabitants of the little district of Hellas.

HELLBENDER. A large, ugly-looking, but harmless salamander (*Cryptobranchius alleghaniensis*), which occurs in Ohio, Pennsylvania, Tennessee, and southward. It is also commonly known as alligator and water dog. It is voracious and feeds on crayfish, fish, and other water animals and readily takes the bait from the fisherman's hook. It exudes much slime and is consequently difficult to handle. It is tenacious of life and can live for hours out of water. The spawn much resembles that of frogs, but is lighter in color. It may reach a length of about 20 inches.

HELLBORN, LOUIS SUSSMAN. See SUSSMAN-HELLBORN.

HELLDEVIL. See CORYDALIS.

HELLE, hēl'ē (Lat., from Gk. Ἑλλη). In Greek mythology, a daughter of Athamas, King of Orchomenus in Boeotia, and the goddess Nephele (Cloud). When Athamas married Ino (q.v.), daughter of Cadmus, Nephele punished the land by a drought. Ino plotted the sacrifice of Phrixus, brother of Helle; but Nephele rescued her children by giving them the ram with the golden fleece, on which they escaped over the sea to Colchis. While passing through the strait between Asia and Europe, Helle fell from the ram and was drowned. The strait was called Hellespont, or sea of Helle, in her honor. The fleece of the ram the Argonauts (q.v.) later sought. See GOLDEN FLEECE.

HELLEBORE, hēl'ē-bōr (Lat. *helleborus*, *elleborus*, from Gk. ἑλέβορος, *ēlēbōros*). A name applied to a number of plants of different genera, but properly to the species of *Helleborus*, a genus which belongs to the family Ranunculaceae, and which contains about a dozen species, most of which are natives of Europe. The species are perennial herbs, with short rootstocks and few stem leaves; the leaves are deeply divided, and the flowers terminal. One of the best-known species is the black hellebore (*Helleborus niger*), which has evergreen leaves and is so called from its black rootstock. Its flowers, which are white or tinged with red, turning green after fertilization, appear very early in the season; in England, frequently during the winter, on which account it is called

Christmas rose. In former times this plant was reputed as efficacious in the treatment of insanity, but it is little used at present. It has some medicinal properties, but in overdoses is an acrid poison. A second species, common in Europe, is the stinking hellebore (*Helleborus foetidus*), which grows upon hills in England and elsewhere, has leafy stems, and greenish flowers tinged with purple. It is noted for its disagreeable smell. Green hellebore (*Helleborus viridis*), which has large, greenish-yellow flowers, is another common European species. It has escaped from cultivation in the eastern part of the United States. *Helleborus orientalis*



HELLEBORUS NIGER.

is the species known to the ancients. To it was first attributed the virtue of a specific for insanity. It is particularly abundant in Greece and the Levant and was formerly very plentiful about Anticyra, where the best was obtained. Of these different species there are many horticultural varieties, some of which are beautiful. On account of their early flowering they are planted usually in shrubberies and borders. Closely allied to the above, and often called winter hellebore, is *Eranthis hyemalis*, the winter aconite, a native of central and southern Europe introduced into England and sparingly escaped in the United States. This plant is employed in horticulture in the same way as the species of *Helleborus*. It has a single large yellow flower surrounded by an involucre of a single leaf.

A third plant, to which the name "white hellebore" is given, is *Veratrum album*. This genus belongs to the Liliaceæ. White hellebore has a leafy stem, 3 to 4 feet high, and a long compound panicle of yellowish-white flowers. It is a native of central and southern Europe and abounds in mountainous regions. The root of this plant is an active, acrid poison and is used in medicine. In a powdered state it is an important insecticide and is especially valuable for dusting over currant bushes as a protection against the currant worm. The American hellebore (*Veratrum viride*), also known as swamp hellebore, Indian poke, and itchweed, is a common plant in wet grounds from Canada to Alabama. Its properties are similar to those of white hellebore. A species commonly known

as *Veratrum californicum* is found from the Rocky Mountains to the Pacific coast. Its properties are doubtless similar to those of the other species, and it is reputed to be the cause of considerable loss to stockmen through its being eaten by stock. The active principle seems in all of the species to be the alkaloid veratrine or a substance similar to it. Some pharmacologists restrict the production of veratrine to the related *Asagrea officinalis*, or *Schœnocaulon officinale*, and call the corresponding alkaloid of *Veratrum viride* veratroidine.

HELLEN (Lat., from Gk. Ἑλλην). In Greek tradition, the son of Deucalion (q.v.) and Pyrrha, and father of Dorus, Æolus, and Xuthus; from Æolus were descended the Æolians, from Dorus the Dorians, while from the two sons of Xuthus, Ion and Achæus, came the Ionians and the Achæans. From Hellen came the collective name of the Greeks, Hellenes (See HELLAS.) The whole story is relatively late, being unknown to the Homeric poems where the Hellenes are a tribe of the Phthiotis a district in Thessaly, and is probably a creation of the eighth century B.C. or later, when the feeling of national unity developed among the Greeks, and the name "Hellenes" received its later meaning. We are told that Hesiod and Archilochus were the first to call the body of Greeks Hellenes.

HELLENES, hēl'ēnz. The name applied by ethnologists to the earliest Greek-speaking Aryans, who on their arrival in the peninsula found the land already inhabited by the Pelasgians, the eastern division of Sergi's Mediterranean species. The Pelasgi, excepting a few scattered groups, became Hellenized, the heterogeneous elements being fused with a Hellenic nationality, built upon a Pelasgic substratum and possessed of Hellenic culture. See GREECE

HELLENICA (Lat., from Gk. Ἑλληνικά, *Hellēnika*, neuter pl. of Ἑλληνικός, *Hellēnikos*, relating to Greece, from Ἑλλάς, *Hellas*, Greece). An historical work in seven books by Xenophon taking up the history of Greece from the point at which the history by Thucydides ends, and covering the 48 years prior to the battle of Mantinea. The work is on the whole a very important authority for the period covered, but suffers from incompleteness, failure to mention momentous events, and the prejudice of the author. Convenient editions with English notes etc., are those by Manatt (Boston, 1888), Bennett (ib., 1892), and Brownson (New York 1908).

HELLENIC STUDIES, SOCIETY FOR THE PROMOTION OF. An English society, organized in 1879 for the advancement of the study of the Greek language, literature, and art, and for the perpetuation of the history of the Greek race in the ancient, the Byzantine, and the Neo-Hellenic periods. It has devoted itself to the collection of drawings, facsimiles, transcripts, plans, and photographs of Greek inscriptions, works of art, ancient sites and remains, and to organizing means for the pursuit of archaeological researches in countries which at any time have been the sites of Hellenic civilization. The society issues annually the *Journal of Hellenic Studies*, which contains the results of the researches prosecuted under its auspices. It has members in every quarter of the globe. Among those who were active in the work of organization were: J. S. Blackie, Sidney Colvin, J. P. Mahaffy, A. H. Sayce, Sir Richard Jebb, Sir

John Lubbock, and Hon. A. J. Balfour. The society has about 900 members, including foreign members in every quarter of the globe. The annual meeting of the society takes place in June.

HELLENIST (Gk. Ἑλληνιστής, *Hellenistēs*, one who speaks Greek, from Ἑλληνίζειν, *Hellenízein*, to speak or make Greek, from Ἑλλην, *Hellen*, Greek, from Ἑλλάς, *Hellas*, Greece). In biblical and Jewish history, a Jew distinguished by the adoption or affectation of Greek thought, manner, or language. The Greek word is found in the Bible only in Acts vi. 1; ix. 29; xi. 20 (cf. the Revised Version, margin), and in the last two of these passages the Codex Alexandrinus reads, not "Hellenist," but "Greek" (Ἕλλην). The latter term, which occurs rather frequently in the Greek Bible, chiefly in the books of the Maccabees, the writings of Paul, and the Acts, is used generally for the heathen, in distinction from the Jewish world, although at times in a more narrow sense of the cultured, in distinction from the barbarian, part of the non-Jewish world. After the conquest of the civilized world by Alexander the number of Jews outside of Judæa, and especially in Egypt, Cyrene, and Syria, increased very rapidly. In these countries the Jew soon lost the use of his original Palestinian Aramaic and came to speak Greek, finally using it altogether, even in the synagogue services. Many Jews in these circumstances were brought into close contact with Greek thought and literature and in some cases were ardent students of Greek philosophy. To their more rigid brethren in Judæa such Jews were "Hellenists," and all Greek-speaking Jews were liable to be thus designated. Even in Judæa a Hellenizing party grew up, and the conflict of tendencies thus engendered precipitated the Maccabæan War (168-142 B.C.). The war put an end to the Hellenizing propaganda, and the term "Hellenist" came to be used with no special prejudice, simply as a designation for a Jew whose native tongue was Greek and not Palestinian Aramaic. If "Hellenists" is the original reading in Acts xi. 20, which does not seem probable, then Luke must have used the word inadvertently as practically equivalent to "Greeks." See **JEWS**; and for the Hellenistic Greek dialect, see **BIBLE**.

HELLENISTIC ART. See **GREEK ART**, *History*, III, The Hellenistic Period.

HELLENISTIC GREEK. See **GREEK LANGUAGE**, *Later History*.

HELLENISTIC PERIOD. See **ALEXANDRIAN AGE**; **GREEK ART**, *History*, III, The Hellenistic Period; **GREEK LANGUAGE**, *Later History*; **GREEK LITERATURE**, 4, *The Alexandrian Age*.

HELLENISTIC PHILOSOPHY. See **GREEK PHILOSOPHY**.

HELLER, hēl'ēr, KARL BARTHOLOMÄUS (1824-80). An Austrian naturalist, born at Myslbořitz, Moravia, and who was a professor in the Theresianum at Vienna. He traveled in Central America and Mexico in 1845-47 and is best known for his attempt to classify the fauna of that region in his *Reisen in Mexiko in den Jahren 1845-48* (1853).

HELLER, STEPHEN (1814-88). An Hungarian composer and pianist, born in Budapest. When only nine, he performed so successfully in public that he was sent to Vienna to continue his studies. In 1827 he played in Vienna and in 1829 began a concert tour through Eu-

rope with his father, which was interrupted in 1830 by a serious illness at Augsburg. Here he remained from 1830 to 1838. He had meanwhile continued his musical studies and upon going to Paris became an intimate friend of Chopin, Liszt, and Berlioz. As a pianist, Heller now became well known, but his compositions gained favor more slowly. They are characterized by a fresh, natural beauty, forceful treatment of themes, and exquisite melody. In the originality of his themes Heller far outranks Mendelssohn, with whom, however, he has much in common. His studies for the pianoforte are among the very best and are in universal use. With the exception of two visits to London, Heller lived in Paris from the time of his first journey there in 1838 to his death. For his life, consult Barbadette (Paris, 1876; Eng. trans., 1877); R. Schütz, *Stephen Heller: Ein Künstlerleben* (Leipzig, 1911).

HELLESPONT. See **DARDANELLES**.

HELLEU, hēl'ē, PAUL (1859-). A French dry-point etcher and painter. He was born at Vannes and studied painting at the Ecole des Beaux-Arts with Gérôme, although following impressionism. He began as a painter of dim Gothic naves and stained glasses, such as "Glasses of St. Denis," in the Boston Museum; then took up landscape, depicting autumn scenes with falling leaves, like his "Study of Versailles," in the Luxembourg; and he also painted portraits. But his chief reputation is in dry-point (q.v.) etching, of which he became probably the greatest master of his time. He received his first instruction in this medium from James Tissot. His principal theme the portraiture of modern woman tastefully and fashionably attired, he depicts her with unstudied elegance and refinement and in graceful spontaneous poses, which place his work in a class by itself. Using a diamond-pointed needle, he draws directly upon the copper plate with a sureness of line that knows no error and a power of selection that chooses only the essential. The effect is that of a spirited drawing, often heightened by the use of more than one color in printing. He has of course represented Parisian women more than any others, his favorite subject being his wife, whom he has drawn in all manner of poses, especially with his children. He has also portrayed Englishwomen and many Americans, including the Duchess of Marlborough, Mrs. Philip Lydig, Miss Carol Harriman, Mrs. Walter Lewisohn, and Mrs. Leonard Thomas—the last three belonging to a series of about 30 executed by the artist on a visit to the United States in the winter of 1912-13. Consult Clément-Janin, in *Die graphischen Künste*, vol. xxvi (Vienna, 1903), and Wedmore, *Etchings* (London, 1911).

HELLEVOETSLUIS, hēl'ē-vōt-slois', or **HELVOETSLUIS**. A fortified seaport of the Netherlands, on the southern coast of Voorne in the Province of South Holland (Map: Netherlands, C 3). It has a good harbor, wet and dry docks, an arsenal, shipyards, a naval school, large artillery stores, and is connected by steam tramway with Rotterdam. Pop., 1900, 4299; 1910, 4355. Hellevoetsluis is noted as the place where William of Orange embarked for England in November, 1688.

HELL-FIRE CLUBS. The name given to certain associations in England, Ireland, and Scotland, formed of profligate persons of both sexes, which came into existence in the early

part of the eighteenth century. Several were suppressed by royal proclamation in 1721.

HELL GATE. A passage, called by the Dutch settlers of New York Helle Gat, being that part of the East River between Long Island and Manhattan Island, also between Long Island and Ward's Island, and between Ward's Island and Manhattan Island. The reefs of rock in the main passage, some of which were islands at low tide, caused with the rising and falling of the tide numerous whirlpools and eddies, which rendered navigation at times dangerous, always difficult, and for large ships impossible, although the depth in the tortuous channel might be sufficient. The East River receives the Sound tide from the east and the Sandy Hook tide from the south. The times as well as heights of these tides being different, additional force is imparted to these treacherous currents. It was claimed that one out of every 50 sailing vessels attempting to go through Hell Gate was more or less damaged by the rocks.

A survey was made in 1848 by Lieutenants Charles H. Davis and David Porter, of the United States navy, and in their report they recommended the destruction by blasting of Pot Rock, Frying Pan, and Ways' Reef, which lie between Long Island and Ward's Island.

The first attempts at removing the obstructions in Hell Gate were made by M. Maillefert, with whom a contract was made by citizens of New York. He commenced work in August, 1851, and by surface blasting operated upon the most prominent surface of the smaller rocks obstructing Hell Gate and of a part of Diamond Reef and reduced them to an average depth of about 16 feet, the work costing \$13,861.59. Congress, in 1852, appropriated for the work \$20,000 and placed it under the direction of Major Fraser. Pot Rock was reduced to 20.5 feet below mean low water. The method was by surface blasting, as had been practiced by M. Maillefert. The reefs in this channel are largely composed of a stratified gneiss, and the layers, being tipped up nearly perpendicular, were unevenly affected by the action of the water, the softer parts being worn away and the harder parts left in vertical sheets or points. In 1866 Gen. John Newton, of the United States Engineer Corps, was ordered to make a survey, and proposed the construction of a drilling scow which should be securely moored at the site of operations. The machine was constructed, and put into operation on Diamond Reef, near the mouth of the East River, in May, 1871. Coenties Reef was also operated on with this scow in alternation with the work on Diamond Reef. These operations proving satisfactory, the machine was taken to Hell Gate, where it was in operation nearly three years and effected a great improvement in the channel.

The first really important engineering accomplishment was the removal by tunneling and blasting of Hallet's Point Reef, which extended from the Astoria shore into the East River. By means of diverging tunnels and transverse galleries the reef was thoroughly undermined, and nitroglycerin in cans was introduced into a large number of holes drilled in the pillars supporting the roof and in the roof itself. After water was let into the mine, the charge was exploded and the reef was destroyed, the débris being removed by grappling and dredging, so that there was a depth of 26 feet at low water

over the site of the reef. The explosion at Hallet's Point took place Sept. 24, 1876, and was followed by energetic prosecution of work on Flood Rock, or Middle Reef, where similar tunnels were constructed. After over 21,000 feet of tunneling had been constructed and holes aggregating 113,102 feet had been drilled, 300,000 pounds of explosives were put into the holes, and water was let into the tunnel. The result of the explosion that took place Oct. 10, 1885, and subsequent dredging which has since been in progress, provided a channel of at least 200 feet in width and a depth of at least 26 feet through Hell Gate, the width of channel varying from the minimum width mentioned off Hallet's Point for a short distance. In 1914 a steel arch bridge, supported on concrete bents, with a span of 977.5 feet across the East River at Hell Gate, was under construction.

HELL/GRAMMITE FLY, or **HELLDEVIL.** See CORYDALIS.

HELLHOFFITE. See EXPLOSIVES.

HELLIN, á-lyén'. A district town of the Province of Albacete, Spain, situated near the river Mundo, 69 miles north-northwest of Murcia (Map: Spain, E 3). In its vicinity are sulphur springs and mines. The sulphur mines have been worked since Roman times, and their exploitation is still the principal industry of the town. It is a market for agricultural products, wine, and oil, and produces woolen textiles, leather, and pottery. Pop., 1900, 12,787; 1910, 17,781.

HELL/MANN, GUSTAV JOHANN GEORG (1854-). A German meteorologist and geographer, born at Löwen and educated at Göttingen. In 1879 he was made assistant, in 1882 temporary head, of the Meteorological Institute of Berlin, and in 1907 director. He also became professor at the University of Berlin in 1905. He was vice president of the Berlin Geographical Society and after 1892 a director of the *Meteorologische Zeitschrift*. Besides his contributions to the latter, Hellmann's more important works are: *Repertorium der deutschen Meteorologie* (1883); *Meteorologische Volksbücher* (1891); *Das Klima von Berlin* (1891); *Schneekrystalle* (1893); *Regenkarte der Provinz Schlesien* (1899); *Regenkarte der Provinzen Ostpreussen, Westpreussen und Posen* (1900); *Regenkarte der Provinz Brandenburg und Pommern* (1901); *Denkmäler mittelalterlichen Meteorologie* (1904); *Die Niederschläge in den norddeutschen Stromgebieten* (3 vols., 1906); *Internationaler Kodex* (1907; 2d ed., 1911); and the series *Meteorologische Neudrucke* (1893-1900).

HELLMESBERGER, hël'mës-bërk'ër. A family of Austrian musicians whose founder, GEORG (1800-73), was a celebrated violin teacher in Vienna. In 1829 he became conductor of the Imperial Opera and in 1833 a professor at the Vienna Conservatory. He made several successful tours and composed considerable music for the violin.—His two sons, GEORG, JR. (1830-52), and JOSEPH (1829-93), were talented violinists. The former produced two operas, *Die Bürgschaft* and *Die beiden Königinnen*, and made a tour through Germany and England. Joseph was first violin of the Hellmesberger Quartet (1849-87), violin professor at the Conservatory (1851-77) and director (1851-93); concertmeister at the Imperial Opera (1860); soloist in the Court Orchestra (1863) and court conductor (1877).—His son JOSEPH (1855-)

is the most important member of the family. He was second violin in his father's quartet and in 1887 succeeded him as leader. In 1878 he became a professor at the Vienna Conservatory and after having been a violinist in both the Imperial and Opera orchestras was made leader in 1884, and kapellmeister in 1887, of the Court Opera. His compositions are wholly dramatic and include six operettas, produced at Munich, Vienna, and Hamburg, numerous ballets, and some incidental music.

HELLMUTH, hēl'mūṭ, ISAAC (1817-1901). An English clergyman, born at Warsaw, Poland, of Jewish parentage. He was educated at Breslau, became converted to Christianity, emigrated to Canada in 1844, and was ordained a priest in the Protestant Episcopal church in 1846. He founded Huron College and other schools and was Bishop of Huron from 1871 to 1883. He was also a professor at Bishop's College, Lennoxville, Canada, and in 1881 established Western University, in connection with Huron College. He then went to England to become Assistant Bishop of Ripon. In 1885 he was made rector of Bridlington; in 1891 chaplain at Holy Trinity, Pau; and in 1897-99 was rector of Compton Pauncefoot, Somerset. Among his published works are *The Genuineness and Authenticity of the Pentateuch* (1867) and a *Biblical Thesaurus* (1884).

HELLQVIST, hēl'kvist, KARL GUSTAF (1851-90). A Swedish historical painter. Born in Kungsör, he was a pupil of the Stockholm Academy and continued his studies at Munich (1878-82) and at Paris (1882-86), at the same time producing important works. He became professor at the Berlin Academy in 1886, but afterward lived in Munich. His early death cut short a promising career. Besides other honors, he was awarded the great gold medal at Vienna (1882) and a gold medal at Munich (1883). Hellqvist belongs to the best historical painters of the later nineteenth century. His principal works include: "Entry of Sonnanvader and Knut into Stockholm, 1526" (1879), Metropolitan Museum, New York; "The Death of Sten Sture" (1880) and "Sack of Visby by Valdemar IV, 1361" (1882), both in the National Museum, Stockholm; "The Embarkment of the Body of Gustavus Adolphus" (1885); "Huss Going to the Stake" (1887).

HELLRIEGEL, hēl'rē-gel, HERMANN (1831-95). A noted German agricultural chemist, born at Mausitz in Saxony. In 1857 he became director of the agricultural experiment station of Brandenburg and Niederlausitz at Dahme, from which he resigned in 1873, and in 1882 accepted a similar post at Bernberg, where he died. From 1873 to 1882 he was wanderlehrer at Bernberg. Among his many agricultural investigations with plants none rank in importance with his demonstration of the ability of leguminous plants to assimilate the free nitrogen of the air, and his discovery of the tubercles on the roots as the agency through which this takes place. The question of the ability of leguminous plants to use the nitrogen of the air had long been one of inquiry, and its settlement by him marked an epoch in the agricultural world. The important parts of these experiments he published in *Untersuchungen über die Stickstoffnahrung der Gramineen und Leguminosen* (Berlin, 1888) and *Ueber Stickstoffnahrung landwirtschaftlicher Kulturgewächse* (Vienna, 1890). Consult Römer, *Hermann Hell-*

riegel, Nachruf (Leipzig, 1896). See LEGUMINOSÆ.

HELLWALD, hēl'vālt, FERDINAND VON (1843-84). An Austrian historian of literature, born in Vienna. From 1862 to 1874 he was employed in the Imperial Library there, studied the North Germanic dialects and literatures, and was sent to the Netherlands by the library. He published (1866) the *Voyage d'Adrien Mathan au Maroc 1640-41*, and (1873) the second part, found by him in the library at Vienna, of Jakob von Maerlant's *Spiegel historiel* and other valuable works. His own writings are: *Vlaamisches Leben, Geschichten und Bilder* (1867); *Geschichte des holländischen Theaters* (1874); *Geschichte der niederländischen Litteratur*, completed and edited by Schneider (1887).

HELLWALD, FRIEDRICH VON (1842-92). An Austrian writer on geography and the history of civilization; brother of Ferdinand von Hellwald and born at Padua. He entered the Austrian army in 1858 and was lieutenant of cavalry (1866) in the war with Prussia; from 1871 to 1873 at Augsburg, then till 1882 at Cannstatt, he was editor of *Das Ausland*. His first work of any importance bears the title of *Die amerikanische Völkerwanderung*. It was published in Vienna in 1866 and laid the foundation of his reputation as a student. His other works, generally more popular than scientific, include: *Maximilian I., Kaiser von Mexiko* (1869); *Kulturgeschichte in ihrer natürlichen Entwicklung bis zur Gegenwart* (4th ed., 1896-98); *Die Erde und ihre Völker* (4th ed., 1897); *Naturgeschichte des Menschen* (1883-84); *Amerika in Wort und Bild* (1883-85); *Frankreich in Wort und Bild* (1884-87); *Die menschliche Familie nach ihrer Entstehung und natürlichen Entwicklung* (1889); and the posthumous work, edited by Möller, *Kulturbilder* (1894).

HELM, hēlm (AS. *helma*, Icel. *hjálma*, helm). The steering apparatus of a vessel. It consists of a rudder and tiller, and, in ships, of a steering wheel supplemented in large vessels by a steering engine. The rudder, which may be of either iron or wood, is the part of the apparatus which is in the water. Its shape is variable, but is usually nearly that of a rectangle, with rounded corners, and in old ships slopes upward at the top from the after edge towards the rudder post, to which it is ordinarily pivoted along the forward edge. In many modern ships the rudder is more or less perfectly balanced as to pressure by having the rudder post or pivot nearly in the centre (but always somewhat nearer the forward edge); this reduces the power necessary to put it over and keep it there. The ordinary rudder is supported by *pintles*, or arms bent at right angles and projecting from the rudder post; the balanced rudder, by a skeg or shoe at the heel; and both by a collar around the rudder head. The tiller is the lever which works the rudder. It either passes through a slot in the rudder head or fits over it, and consists of a straight bar of wood or steel; or in some ships it is replaced by a *quadrant*, which consists of a sector of a circle secured to its centre, which is the rudder post or head, and having chains attached to its corners and passing around its surface before leading to the wheel or engine. The *wheel* consists of one or more wheels, with 8 to 16 spokes projecting through the rims to form handles, and a barrel or axle around which the wheel ropes are wound. One

wheel rope winds around its forward end in one direction and the other around the after end in the opposite direction, so that one unwinds as the other winds up, when the helm is put over to one side.

Steering engines are used when the rudder and tiller are large, or when it is desired to effect quick working of the rudder by affording extra power. The engines are operated by electric gear in the pilot house or on the bridge, or by means of small wire ropes leading from the valve gear of the engine to a wheel located in those places. In steering, the terms used to designate the position of the rudder, except in Germany and in the United States navy, refer to the placing of the tiller. Thus, when the *helm is aport*, the tiller is pressed over towards the port side of the ship; similarly, we have the *helm amidships* and *astarboard*; the helm is *alce* when the tiller is pressed over to the lee side, i.e., the side away from the wind; the helm is *aweather* when over towards the other side, and it is *hard aport*, *hard astarboard*, *hard alce*, etc., when it is pressed as far over as it will go in that direction. To *right* the helm is to put the tiller amidships; to *shift* it is to put it from one side to the other. To *ease* the helm is to let the tiller come more nearly amidships so as to ease the strain on the tiller. When a vessel is turning under control of the rudder, to *meet her* with the helm is to shift the helm and prevent her from turning any farther. *Nothing to starboard* (or port) is a direction to the helmsman cautioning him to steer as good a course as possible, but in any case not to run to starboard (or port) of the desired course. In Germany and in the United States navy the orders to the *steersman* are *right rudder* and *left rudder* instead of *starboard* and *port*. This makes the order simpler and less likely to be misunderstood, because if you wish the ship's head to go to the right you say *right rudder*, if to the left, *left rudder*. Instead of *hard astarboard* you say *hard right rudder*. Instead of *right the helm*, you say *rudder amidships*, and in place of *ease the helm* you say *ease the rudder*.

Helmsman. In large ships without steering engines two or more men are necessarily stationed at the wheel; in sailing ships the man on the weather side is the helmsman, and the others are assistants. In men-of-war a quartermaster is in charge of the steering; he keeps watch of the course, sees that the helmsman steers correctly, and tends to other matters, such as reading the barometer, thermometer, and hygrometer, and filling in the columns of the log every hour (if there is no junior officer). As stated above, in the United States navy the helmsman is now known as the *steersman*.

HELM, ISRAEL (c.1615-c.1695). A Swedish colonist in America. Probably a soldier in Sweden, he was one of the earliest settlers on the Delaware; lived at Passyunk (now Philadelphia), where he was collector of customs (1659); in 1668 became a member of Captain Carr's council, and was one of the number who received a grant of Calken Hook in the same year; and, about 1674, was justice "for the river" and probably a member of the earlier Upland Court. Helm did much service as interpreter in conferences with the Indians, especially in 1675, in the meeting of the New Jersey Indians, Governor Andros, and the Swedish authorities at New Castle, Del. He is possibly to

be identified with Israel Holms, an old Swede, on whose authority Rudman tells of the end of Peter Minuit.

HEIMBOLD, hēlm'bōlt, LUDWIG (1532-98). A German theologian and hymnologist, born at Mühlhausen, Thuringia, where he was a deacon (1571-98). He was educated at Leipzig and Erfurt. At the latter university he taught (1554-86), but was finally forced out because of his bitter opposition to the Catholic members of the faculty. He went back to Mühlhausen and became superintendent of the town. He was a skillful Latin versifier and besides Latin hymns wrote spiritual songs in the vernacular, which won him the name "the German Asaph"; among these mention should be made of: *Von Gott will ich nicht lassen*; *Du Friedefürst, Herr Jesu Christ*; *Es stehn vor Gottes Throne*. For his biography, consult Thilo (Berlin, 1851).

HELMER, NORA. The heroine of Ibsen's drama of modern life, *A Doll's House*. She is, at the opening of the play, a thoughtless, superficial creature, who is alternately petted and scolded by her narrow-minded husband and thus becomes wholly unfitted to face or even comprehend life's realities. She impulsively commits a heinous crime and only then discovers her own and her husband's actual natures. She escapes paying the legal penalty, but leaves her home with the determination to learn the truth regarding life, humanity, and herself.

HELMERS, hēlm'ers, JAN FREDERIK (1767-1813). A Dutch poet, born at Amsterdam. His first work, a tragedy, was moderately successful, and he followed it by a poem, *Socrates* (1790). His *Hymn to Napoleon Bonaparte* (1801) first made him famous and *The Dutch Nation* (1812), his masterpiece, an heroic poem in six cantos, added to his reputation. At a time when Holland was under French rule these fiery patriotic poems revived the nation's enthusiasm. A posthumous volume of his poetry appeared in 1815.

HELMERSEN, GRÉGORY PETROVITCH (1803-85). A Russian geologist, born at Duckershof in the Government of Livonia. He was educated at Dorpat and various German universities, from 1833 to 1863 was professor of geognosy and geology in the school of the mining engineer corps, and from 1865 to his retirement in 1872 director of the Mining Institute. He attained the military rank of lieutenant general and was a member of the St. Petersburg Academy of Sciences. In 1829 he accompanied Alexander von Humboldt in the exploration of the lower courses of the rivers Volga and Ural. His chief published writings were his contributions to the extensive scientific work on the Russian Empire and the adjacent Asian countries, published by the St. Petersburg Academy of Sciences, under the editorship of himself and Von Baer (26 vols., 1839-71).

HELMERT, FRIEDRICH ROBERT (1843-). A German geodesist, born at Freiberg, Saxony. He was educated at the Polytechnic of Dresden and Leipzig University, in 1869-70 was observer in the Hamburg Observatory, and in 1870 became instructor in geodesy in the Technical College of Aix-la-Chapelle. In 1886 he was appointed director of the Royal Geodetic Institute of Prussia, and in 1887 professor of geodesy in Berlin University. In addition to numerous contributions to the *Astronomische Nachrichten*, the *Zeitschrift für Vermessungs-*

wesen, and other technical periodicals, he published several volumes, including: *Die Ausgleichungsrechnung nach der Methode der kleinsten Quadrate* (1872); *Die mathematischen und physikalischen Theorien der hohen Geodäsie* (1880-84); *Die Schwerkraft im Hochgebirge insbesondere in den Tyroler Alpen in geodätischer und geologischer Beziehung* (1890); *Beiträge zur Theorie des Reversionspendels* (1898); *Schwerkraft und die Massenverteilung der Erde* (1910).

HELMET (dim. of *helm*, Goth. *hilm*s, OHG. *helm*, Ger. *Helm*, helmet; connected ultimately with Skt. *śarman*, protection, AS., OHG. *helan*, Ger. *hehlen*, Lat. *celare*, Gk. *καλύπτειν*, *kalyptein*, to hide, OIr. *celim*, I hide). A covering wholly, or in part, of metal, used in warfare to protect the head. Such protections have been used from the earliest times and have been made in many different forms. The simplest form is in the shape of a close-fitting skullcap. Such helmets are represented on the Assyrian monuments. They were of iron or leather and sometimes were provided with a defense for the neck. A tendency towards decoration is shown in some of the bas-reliefs, where warriors are represented with elevated helmets terminating in a point. The Greeks of the Homeric age are occasionally described as wearing very elaborate helmets. In the *Iliad* Agamemnon places on his brow a lofty helm, four-crested, double-peaked, with horsehair plumes. At a later period the Greeks used helmets of different shapes, usually with protections for the face and neck and sometimes surmounted by figures of birds or animals. Many of these were richly decorated. The Etruscans wore bell-shaped helmets, which often had projecting pieces like wings, which gave them a very peculiar appearance. The Romans ordinarily used a plain, undecorated skullcap, strengthened by crossbands of iron and with a neck guard. On the march this helmet was removed and carried slung from the right shoulder. Under the later Empire the Greek fashion of helmet became common. The Anglo-Saxons appear to have used a skullcap frequently terminating in a point. The Franks, on the contrary, used no protection for the head. But under Charles the Great the Imperial household guards wore helmets of a triangular shape, surmounted by conventionalized scrollwork or foliage. In the Bayeux tapestry the warriors wear conical helmets, with a straight piece descending in front to protect the nose. The most characteristic helmet of the Middle Ages, which was in vogue from the twelfth to the fourteenth century, was cylindrical in form and covered the head and a part of the neck. There were round openings through which the warrior could see and breathe. It was so heavy that it was put on only at the moment of combat and only when the knight fought on horseback. It was a very effective defense against a cut from a mediæval weapon, but no protection against bruises. In great contrast with this was the headpiece worn by the Saracens, with whom the Crusaders came into contact. They used light globular helmets of iron, richly ornamented and adorned with plumes. In the fourteenth century the heavy helmet was to a great extent discarded by the western knights for the lighter basinet; but it continued to be used in tournaments until the eighteenth century. As the employment of firearms became more general, helmets naturally lost their utility, especially

as regards the face. Those still remaining are, in the equipment of troops, limited for the most part to heavy cavalry, afford no protection to the face, and must be considered as rather for ornament than use. Firemen wear a heavy headpiece of leather and brass to protect them as far as possible from falling brands and cinders at conflagrations. In India and other hot climates helmets of white felt, with the additional screen of rolls of linen, are worn by the military as well as by members of the civil service to protect them from the hot rays of the sun.

In heraldry, the helmet, from the early simple form known as the Norman, came at a later period to vary in shape according to the degree of the person who bore it, and helmets were set over coats of arms to bear the crest and to indicate by their form the rank of the bearer. The following forms of helmet are in use in English heraldry: 1. The helmet assigned to the King and to the princes of the blood royal; it is full-faced, composed of gold, and has the visor divided by six projecting bars. 2. The helmet of earls, viscounts, and barons is of silver, adorned with gold, has five bars, and is set in profile. 3. The helmet of knights and baronets is of steel, full-faced, with the visor thrown back and without bars. 4. The helmet of esquires is always presented in profile and is of steel with the visor closed. These distinctions are of comparatively recent date. A much greater variety of helmets is in use in continental heraldry. A helmet is never placed over the arms of any woman except the sovereign. Consult Boutell, *English Heraldry* (4th ed., London, 1879), and Ashdoun, *Arms and Armour* (New York, 1909). See **HERALDRY**.

HELMET BIRD. One of the names given to the turacos (q.v.), on account of their high, brilliantly colored crests. An Australian cockatoo, the gangan, is called helmet cockatoo, and African shrikes of the genus *Prionops* are called helmet shrikes for a similar reason.

HELMET CRAB. See **KING CRAB**.

HELMET CREST. A South American humming bird of the genus *Oxygogon* (in which there are four species), which has a tall, pointed, erectile crest suggesting a helmet plume and also chin feathers resembling a long beard. See **PLATE OF HUMMING BIRDS**.

HELMET HORNBILL. See **HORNBILL**.

HELMET QUAIL. A California crested quail (q.v.).

HELMET SHELL (so called from the resemblance of the shell to a helmet). One of a genus (*Cassis*) of large, active gastropods, allied to the strombs and typical of the family *Cassidae*. They have thick, heavy shells, boldly ridged and often handsomely colored, and some species, as the black helmet shell of the West Indies (erroneously named *Cassis madagascarensis*) and *Cassis glauca* of the East Indies, are extensively used for making cameos (see **CAMEO**), because the shell is in layers of different colors. About 50 species are known, mostly Oriental; but some inhabit the Mediterranean and West Indian waters, and all are carnivorous, preying mostly on bivalve mollusks.

HELMHOLTZ, hēlm'hōlts, HERMANN L. F. VON (1821-94). A German physicist, one of the most distinguished scientific men of the nineteenth century and an authority in several departments of science. He was born at Potsdam and studied medicine in Berlin, subse-

quently serving as a surgeon in the army (1843-47). He then became assistant in the Berlin Anatomical Museum, and a professor of physiology, occupying chairs at Königsberg (1849-58), at Bonn (1855-58), and at Heidelberg (1858-71). In 1871 he became professor of physics at the University of Berlin. In 1887 Helmholtz became in addition director of the Physikalisch Technische Reichsanstalt at Charlottenburg and supervised the researches of this important institution. He was equally distinguished in physiology and in many branches of experimental and mathematical physics. He was selected as honorary president of the International Congress of Electricians held at Chicago in 1893, and it was said then of him that he could easily have been selected as first in several other departments of human knowledge quite distinct and apart from that of electricity. His physiological works are principally connected with the eye and the nervous system. As a physicist, Helmholtz first attracted attention from the scientific world by a paper which he presented to the Physical Society of Berlin in 1847 on the "Conservation of Force." This paper, regarded by many as a fantastic speculation, provoked considerable discussion and established Helmholtz's reputation. His invention in 1851 of the ophthalmoscope (q.v.), an instrument which enables an observer to examine the interior of the eye, gave to the oculist a most useful device now in universal use. His wonderful monograph on *Sensations of Tone* was first published in 1863 and was the most important work on acoustics of the nineteenth century. To Helmholtz, whose great work on *Physiological Optics* appeared in 1856-66, is due the generally accepted theory of color, which is that of Young (q.v.) in a modified form, wherein the perception of color depends upon the three fundamental sensations of red, green, and violet or blue. He also developed the electromagnetic theory of light in a manner which indicated its general possibilities. Another important research was on the theory of vortex motion; and not only did he discover the fundamental properties of such motion, but he so stated his conclusions that they have been used to explain various physical phenomena and in hypotheses concerning the constitution of matter and the luminiferous ether. He was the inventor of many ingenious methods in practical physics as well as new apparatus. In 1883 the German Emperor conferred upon him a title of nobility. He visited the United States in 1893 and died in Berlin, Sept. 8, 1894. The first edition of *Die Lehre von den Tonempfindungen, als physiologische Grundlage für die Theorie der Musik*, appeared in 1863, and several other editions and translations have since been published. The *Handbuch der physiologischen Optik* was published in 1897, and Helmholtz's *Gesammelte wissenschaftliche Abhandlungen* in 1882-83. Helmholtz was a contributor to the leading scientific journals of the world and was the recipient of many honors. An interesting biographical sketch, by Prof. A. W. Rücker, F.R.S., was published in the *Fortnightly Review* for November, 1894, and reprinted in the *Smithsonian Report* of the same year. Consult also: Königsberger, *Hermann von Helmholtz* (Leipzig, 1902; Eng. trans. by Welby, Oxford, 1906); Kendrick, *H. L. F. von Helmholtz* (London, 1899); G. S. Hall, *Founders of Modern Psychology* (New York, 1912).

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HELMOLD, hēl'mōlt. A twelfth-century German historian of the Slavs. He was born in Holstein and was a priest at Bosau. He was intimate with Gerold, the Bishop of Lübeck, once a missionary among the Slavs, who urged him to write a history of the wars with them and the missions among them. This history, *Chronica Slavorum*, extends from Charlemagne to Helmsold's own time and the days of Henry the Lion (1172), continued to 1209 by Arnold von Lübeck (q.v.). It is best edited by Lappenberg (1868), separately, and in vol. xxi of *Monumenta Germaniae*; also in German translation by Laurent (1852).

HELMOLTZ, hēl'mōlt, HANS F. (1865—). A German editor and historian, born at Dresden. He studied philology and history at Leipzig and Bonn and was appointed to an editorial post in the Bibliographic Institute at Leipzig. His publications include *König Rupprechts Zug nach Italien* (1892), *Fabricius und Siber* (1895), and the compendious *Weltgeschichte* (9 vols., 1899-1907; Eng. trans., New York, 1902-08), a work based on an ethnographic method, in the preparation of which he was assisted by 37 specialists. Among his other works may be mentioned: *Briefe der Herzogin Elisabeth Charlotte von Orléans*, i (1907), ii (1908); *Ranke-Bibliographie* (1910); *Briefe Gustav Freytags an A. von Stosch* (1913).

HELMONT, hēl'mōnt, Fr. pron. ēl'mōn'. A town in the Province of North Brabant, Holland, situated on the Zuid Willems Vaart, 73½ miles by rail southeast of Rotterdam (Map: Netherlands, D 3). There are a number of extensive textile mills, dyeing establishments, cigar factories, and various other manufacturing establishments. It also possesses a remarkable old château dating from 1403. Pop., 1900, 11,436; 1910, 15,147.

HELMONT, hēl'mōnt, JAN BAPTISTA VAN (?1577-?1644). A Belgian physician and chemist, born at Brussels. He studied at Louvain, and received the degree of M.D. in 1599. For several years afterward he traveled extensively in Switzerland, Italy, France, and England. In 1605 he married Margaret van Ranst, a noble lady of Brabant, and in 1609 he settled down at his estate near Vilvorde, where he spent the remainder of his life in medical practice and scientific investigation. Writers on the history of chemistry regard him as one of the greatest chemists who preceded Lavoisier. He paid much attention to the study of gases and is supposed to have been the first to use the word "gas" as a generic name for all elastic aëiform fluids. Of these gases he distinguished several kinds. He was also the first to adopt the melting point of ice and the boiling point of water as standards of the measurement of temperature. In his works the term "saturation" was first employed to signify the combination of an acid with a base, and he was an early investigator of the chemistry of the fluids of the human body. Along with other physiologists of his day, he speculated much on the seat of the soul, which he placed in the stomach.

The most important of his works is his *Ortus Medicinæ*, which was published by his son, four years after his death; it passed through a large number of editions and was translated into Dutch, French, German, and English. A curious volume, containing translations of some of his works, was also published by W. Charlton, in 1650, under the title of *The Ternary of*

Paradoxes; the Magnetic Cure of Wounds; the Nativity of Tartar in Wine; and the Image of God in Man. Consult Rommelaere, *Etudes sur Helmont* (Brussels, 1868).

HELMSTEDT, hēlm'shtēt. A town in the Duchy of Brunswick, Germany, situated 25 miles by rail from the city of Brunswick (Map: Germany, D 2). It was formerly famous for its university, which existed from 1575 to 1809. The university buildings now contain the remnants of the university library. Helmstedt manufactures agricultural machinery, pottery, woolens, soap, sugar, tobacco, and textiles. There are lignite and potash mines. About 2 miles from the town are the Helmstedt iron springs. Pop., 1900, 14,259; 1910, 16,421.

HELMUND, or **HILMEND**. The largest river of Afghanistan. It rises in the Koh-i-Baba chain and flows southwest, receiving numerous tributaries by which it drains the southern part of the country (Map: Asia, Central, K 7). It discharges into the lake, or rather swamp, of Savarap, near the Persian frontier. Its total length is estimated at over 600 miles. The channel of its lower course is very wide and deep, but is filled only during the summer. The region traversed by the lower course of the Helmund is well populated, and the water power of the river is used by numerous mills. The constant shifting of its course has been the source of border disputes between the Afghans and Persians for years.

HELMUND, ERIK MEYER-. See MEYER-HELMUND.

HEL/MUTH, WILLIAM TOD (1833-1902). An American homœopathic physician. He was born in Philadelphia and studied medicine in the Homœopathic Medical College of Pennsylvania, where he became assistant dispensary physician in 1854 and professor of anatomy in 1885. In 1888 he received the degree of LL.D. from Yale. He was dean and professor of surgery in the New York Homœopathic Medical College in 1870, resigning to become a surgeon in the Hahnemann and New York State hospitals. In 1886 he opened a private hospital. His works include numerous essays, both literary and medical, such as: *Scratches of a Surgeon* (1879); *A Steamer Book* (1880); *Diphtheria; Medical Pomposity; System of Surgery* (1874; rev. ed., 1887); *Suprapubic Lithotomy*; and several volumes of verse, the most popular of which were *With the Pousse-Café* (1892) and *Various Verses* (1901).

HELODER/MA (Neo-Lat., from Gk. ἦλος, ἦλος, nail, wart + δέρμα, derma, skin). A genus of North American lizards, with two species, of which one is the poisonous Gila monster. It represents, according to Cope, a family (Helodermatidae) and superfamily (Helodermatoidea), characterized prominently by the fact that the 3 or 10 acrodont teeth in each jaw are ankylosed by oblique bases, and each is fanglike and grooved both before and behind, as if designed for conducting fluid poison. For full structural details, consult Cope, *Crocodylians, Lizards, and Snakes* (Smithsonian Institution, Washington, D. C., 1900); for external appearance and habits, see GILA MONSTER.

HELOÏSE, a'lo'ēz'. See ABÉLARD.

HELOS (Lat., from Gk. ἦλος, from ἦλος, ἦλος, marsh). A town of Laconia, near the coast and a short distance east of the mouth of the Eurotas, said to have been founded by Heleus, son of Perseus. When the Dorians invaded the Peloponnesus, Helos defended itself

with great stubbornness; it was finally taken, and the inhabitants were made slaves. In Strabo's time it had become a village, and when Pausanias visited it it was already in ruins. The Helots were supposed to have received their name from this town; but the most probable view is that the ethnic term "Helots" is related to the root ἔλ-, take. The plain of the lower Eurotas is still called Helos. There were several other towns of this name in ancient Greece—one mentioned in the *Iliad* and one situated in Argolis.

HEL'OTISM, hēl'ot-iz'm or hē'lot-iz'm (from Lat. Helota, Gk. Εἰλωτῆς, *Heilōtēs*, or Εἰλωτῆς, *Heilōs*, Helot). In botany a symbiotic relation in which one form (see SYMBIOSIS) is regarded (perhaps fancifully) as enslaved by another. This relation differs from parasitism in that the enslaved form is not necessarily harmed; it may even be benefited. Lichens (q.v.) have been given as the type of helotism, the algae being regarded as enslaved by the fungus.

HELOTS, hēl'ots or hē'lots (Lat. *Helotr*, from Gk. Εἰλωτῆς, *Heilōtēs*, or Εἰλωτῆς, *Heilōtai*; probably connected with ἔλειν, *helein*, to seize, capture, less plausibly with ἦλος, *Helos*, a town of Laconia, whence the first Helots were said to have been enslaved. See HELOS). The lowest of the three classes into which the population of ancient Laconia was divided. The Helots were serfs of the soil, the property of the state, by whom alone they could be freed, but were assigned to individual Spartans for the cultivation of their allotments of land. If, as many believe, the Helots were originally the descendants of the pre-Dorian population of Laconia, the distinction of dialect and descent was early lost, for there is no indication of any social or linguistic difference between the Helots and the ruling Spartans. The Helots paid the Spartan proprietors a fixed amount of produce, but could keep the remainder and were thus enabled to acquire property. In fact, in general appearance and intelligence they seem to have been much like the free village population in other parts of Greece. In war they served at first as light-armed troops or as rowers on shipboard; after the Peloponnesian War, they were sometimes employed in the heavy infantry, especially in Asia Minor. They were subject to harsh treatment and were in the absolute power of the Ephors (see EPHORI), though many of the ancient stories are scarcely trustworthy. Their great superiority in numbers and their known discontent rendered them objects of suspicion; and during the Peloponnesian War 2000 of them, who claimed to have rendered distinguished services, were freed and then secretly murdered (see Thucydides, iv, 80). The Spartan secret service (κρυπτεῖα), in which the young men were sent singly through the land to endure hardships and watch symptoms of discontent, kept the Helots under close observation, and formed a means of getting rid of any Helots who were plotting against the state. The statement that the Ephors annually declared formal war upon the Helots, that they might be free at any time to kill any of them without violating religious scruples, is doubtless an error. See SPARTA. Consult Gilbert, *Greek Constitutional Antiquities* (Eng. trans., London, 1895), and Busolt, *Die griechische Staats- und Rechtsaltertümer* (2d ed., Munich, 1892).

HELPER, HINTON ROWAN (1829-1909). An American author and railway projector. He was born near Mocksville, N. C., graduated at Mocks-

ville Academy in 1848, and from 1851 to 1854 lived in California. In 1857 he published a book entitled *The Impending Crisis in the South, and how to Meet it*, which perhaps did more to arouse a widespread opposition in the North to the institution of slavery than any other book except *Uncle Tom's Cabin*. This book was dedicated to the "nonslaveholding whites" of the South and was written to prove that, wholly aside from its immorality, slavery was an economic curse. Between 1857 and 1861 nearly 150,000 copies of the book were circulated, and in 1860 the Republican party distributed it as a campaign document. From 1861 to 1866 Helper was United States Consul at Buenos Aires, Argentine Republic, and afterward devoted his attention chiefly to the promotion of his projected intercontinental railway, or Three Americas Railway, to extend eventually from Bering Sea to the Strait of Magellan. In addition to *The Impending Crisis* his publications include: *The Land of Gold* (1865); *Nojoke: A Question of a Continent* (1867); *The Negroes in Negroland, the Negroes in America, and the Negroes Generally* (1868); *Oddments of Andean Diplomacy* (1879); *The Three Americas Railway* (1881).

HELPS, SIR ARTHUR (1813-75). An English essayist and historian, born at Streatham, Surrey. He was educated at Eton and at Trinity College, Cambridge, and, after leaving the university, obtained a post in the civil service, but resigned in 1841 and retired to the country, where he cultivated his taste for literature. In 1860 he was appointed clerk of the Privy Council, a post which he held until his death. For Queen Victoria he edited the speeches of the Prince Consort (1862) and prepared for the press her own Highland journals (1868-69). After beginning his literary career in 1835 with a series of aphorisms entitled *Thoughts in the Cloister and the Crowd*, Helps attempted the essay, the novel, the drama, and history. With the drama and the novel he failed utterly; with history he succeeded moderately. In this field his best work is represented by *Las Casas* (1868), *Columbus* (1869), *Pizarro* (1869), and *Cortez* (1871)—biographies which grew out of his *Conquerors of the New World and their Bondsmen* (1848-52) and *The Spanish Conquest in America* (4 vols., 1855-61). By his essays he won contemporary fame, especially by *Friends in Council* (four series, 1847-59). It consists of conversations on social and intellectual questions. Helps exhibits throughout these dialogues acuteness, humor, a satire which gives no pain, and a quiet depth of moral feeling and sense of man's social responsibilities.

HELISINGBORG, hēl'sing-bōr'y'. A fortified seaport of Sweden, situated at the narrowest point of The Sound, opposite the Danish town of Elsinore, 2¾ miles distant, with which it is connected by ferry (Map: Sweden, E 8). Several railroad lines run into the town, and it carries on a flourishing trade with Denmark. It exports iron ore, bricks, butter, earthenware, grain, and fish; imports coal, minerals, gun metal, and fertilizers. It has considerable manufactures of sugar, chemicals, and machinery, and has a slaughterhouse, shipbuilding yards, and large copper works. Pop., 1901, 24,670; 1911, 33,943. The most remarkable building in the city is the Kärnan, a brick tower 102 feet high, with walls 13 feet thick. It forms part of an ancient fortress now in ruins. Near the city is the royal residence of Sofiero. Helsingborg has

played a prominent part in the Scandinavian wars. It was almost destroyed in the war between Sweden and Denmark during the reign of Charles XI and was the scene of a Danish defeat at the hands of Swedish peasants in 1710.

HELSINGFORS, hēl'sing-fōrs'; Finnish, **HELSINKI**, hēl'sing-ki. The capital of the Grand Duchy of Finland as well as of the Government of Nyland (Map: Russia, C 2). It is beautifully situated on a peninsula on the Gulf of Finland, 191 miles west of St. Petersburg by sea. The entrance to the harbor is protected by a series of formidable batteries, called the fortifications of Sveaborg and consisting of seven strongly fortified islands and numerous islets, while the harbor itself is further defended by two forts. Helsingfors is next in importance to Kronstadt as a naval station on the Baltic and the largest and handsomest town of Finland. Its streets are broad and regular, and there are a number of handsome squares, with statues of Runeberg and Elias Lönnrot. Of the public buildings, the most prominent are the residence of the Governor, the Senate House, the university buildings, the Lutheran church of St. Nicholas, the Russian church (completed in 1868), the Athenæum (built in 1887), with a picture gallery, and two new theatres. It is well equipped with educational institutions of higher and lower grades. The university, originally founded at Åbo in 1640, and removed to Helsingfors in 1827, comprises four faculties, with over 2600 students, a library of 190,000 volumes, a hospital, a zoölogical and botanical museum, a botanic garden, and a valuable observatory. Another prominent educational institution is the Polytechnic Institute. Helsingfors is the seat of many learned societies. Over 40 Finnish and more than 30 Swedish newspapers and periodicals are published here. Since 1840 Helsingfors has been a favorite bathing place and attracts many visitors from St. Petersburg during summer. The town carries on a considerable trade in agricultural and dairy products with St. Petersburg, England, and Swedish and German ports. Helsingfors has a larger industry than any other place in the country. It has manufactures of beer, sugar, tobacco, liquors, carpets, linen, etc. Helsingfors is the seat of the Governor-General of Finland, the Finnish Diet, and numerous consular representatives, including one from the United States. Pop., 1900, 93,217; 1910, 147,218.

Helsingfors was founded by Gustavus I of Sweden in 1550, a short distance inland; it was removed to its present site in 1640. In 1713 it was destroyed by the Russians. It was fortified in 1729, and came with the rest of Finland into the possession of Russia in 1809. In 1812 it became the capital of Finland. During the Crimean War it was bombarded for two days and nights by the allied fleet without any appreciable injury to its fortifications.

Bibliography. Brummer, *Historiska anteckningar om Helsingfors och Sveaborg* (Helsingfors, 1874); Hertzberg, *Helsingfors för tre hundra år sedan och i våra dagar* (ib., 1888); Ehrström, *Helsingfors stads historia från 1640 till Stora ofreden* (ib., 1890); *Finland in 19. secler* (ib., 1893); P. Nordham, *Bidrag till Helsingfors stads historia*, vols. i, ii (ib., 1905-08); and *Finlandias vyserie*, vol. i (ib., 1906).

HELSINGÖR, hēl'sing-ēr. A seaport of Zealand, Denmark. See **ELSNÖRE**.

HELST, hēlst, BARTHOLOMEUS VAN DER (c.1611-70). A Dutch portrait painter. His

birthplace is uncertain, being assigned to Haarlem and to Dordrecht, and the year of his birth falls between 1611 and 1614. He is reputed to have been a pupil of Frans Hals (q.v.) at Haarlem, and a few of his works, indeed, show this influence. But his art on the whole was directly the opposite of Hals's, and he was more influenced by his other master, Nicolaes Elias, of Amsterdam. The researches of Scheltema show that he was living in Amsterdam in 1636 and probably much earlier. There he married the attractive Constantia Reinst, and in 1654, in conjunction with Nicolaes de Helt Stokade, he founded the Painters' Guild of St. Luke. He died at Amsterdam, Dec. 16, 1670.

His best-known work is the "Banquet of the Civic Guard," now in the Museum of Amsterdam, which was painted to represent the celebration of the Peace of Westphalia in 1648. It contains 24 full-length portraits, characteristic, well modeled, and rich in color. In the same museum are the "Syndics of the Brotherhood of St. Sebastian" (1663), of which there is a replica in the Louvre; the four "Syndics of the Marksmen"; the "Company of Captain Rogloff Bicker" (1639), 32 figures in all; the portraits of the Princess Maria Henrietta Stuart, Burgomaster Andries Bicker, Admirals Kortenaar, Van Ness, and others. Among his other portraits are those of a "Protestant Dame" (1638), and of Paul Potter, at The Hague—one of his most charming works; a "Lady in Blue," in the National Gallery of London; and the portrait of the artist in the Uffizi, Florence. Among those in the United States are portraits of an "Unknown Lady," in the New York Historical Society, and a "Dutch Burgher," "Jean van Male," and the "Guitarist" (the two former being admirable examples of his work), in the Metropolitan Museum, New York. The heads of Helst's portraits are well characterized, and all the details, especially the hands, are carefully drawn. In color he is not so successful, especially in rendering values. The surfaces are smooth but not thin, and he excels in draperies.

HELVEIDIUS. The nom de plume signed by James Madison to his five essays, published in various public journals (1793-96), criticizing the foreign policy of the administration and replying to the letters of Hamilton signed "Pacificus."

HELVELLYN, hēl-vēl'īn. One of the highest mountains in England, 3118 feet high, in the Lake District, Cumberland, between Keswick and Ambleside (Map: England, D 2).

HELVETIC CONFESSIONS. See CREEDS AND CONFESSIONS.

HELVETIC REPUBLIC. See SWITZERLAND.

HELVE'TII, hēl-vē'shī-i. A Celtic people, which, according to Tacitus, *Germania*, 28, originally dwelt between the Rhine, the Main, and the Hercynian Forest. Later, according to Cæsar, they occupied the region between the Jura Mountains on the west, the Rhone on the south, and the Rhine on the east and the north; this region corresponds closely with the western part of modern Switzerland. They are first mentioned as defeating a Roman army in 107 B.C. and in 101 they accompanied the Cimbri (q.v.) on their invasion of north Italy. The great event in their history is their attempted irruption into Gaul, in which they were repulsed by Cæsar. They collected three months' provisions and, to cut off hope of return, burned 12 cities, 400 villages, and all isolated dwellings, and made a general

rendezvous by Lake Leman, in the spring of 58 B.C. Cæsar hastened to Geneva, destroyed the bridge there, raised two legions in Cisalpine Gaul, and, when the Helvetians sent delegates to demand a passage westward, delayed them until he had built a wall along the Rhone 19 Roman miles in length, flanked with redoubts. Having vainly attempted to pass this barrier, the Helvetii took another route, but were followed and defeated with terrible slaughter about 15 miles from Bibracte (modern Mont-Beuvray in Burgundy), and the remnant were obliged to return to their own country, where they became subject to the Romans. Of 368,000 who left their homes, including 92,000 fighting men, only 110,000 returned. In the commotions which followed the death of Nero the Helvetians met with another catastrophe. Remaining faithful to Galba, they were attacked by Cæcina, a general of Vitellius, who dealt with them savagely. Under Vespasian the Helvetii flourished, and by degrees the whole country became completely Romanized. Consult: Vulliéty, *La Suisse à travers les âges* (Paris, 1902); Holmes, *Cæsar's Conquest of Gaul* (2d ed., Oxford, 1911); Cæsar, *De Bello Gallico*, i, 1-29, with the notes in various editions, especially in that by Holmes (ib., 1914).

HELVÉTIUS, ēl'vā'syus', *Fr. pron.* ēl'vā'sé'us', CLAUDE ADRIEN (1715-71). A noted French encyclopædist. He was born in Paris in 1715, educated at the Lycée Louis-le-Grand, and after some practical training at Caen appointed at the age of 23 to the lucrative office of farmer general; but as he was of a very humane and gentle disposition, the cruel and odious duties connected with the post decided him to resign it subsequently for that of chamberlain to the Queen's household. He wearied of the idle and dissipated life of the court, and, marrying in 1751 the daughter of the Comte de Ligneville, he withdrew to a small estate at Voré, where he spent the most of his life in the education of his family, the improvement of his peasantry, and literary labors. In 1758 appeared his celebrated work, *De l'esprit*, in which he endeavored to prove that sensation (*sensibilité*) is the source of all intellectual activity, and that the grand lever of all human conduct is self-satisfaction. But he admits, at the same time, that self-satisfaction assumes different forms; e.g., the self-satisfaction of a good man consists in the subordination of private to more general interests—first to the circle among which he lives, then to the community, and finally to the world at large. The book was denounced by the doctors of the Sorbonne and condemned by the Parliament of Paris to be publicly burned. He then went to England and to Germany, where Frederick II received him with distinction. He died in Paris, Dec. 26, 1771, leaving behind him, besides some other writings, a work called *De l'homme, de ses facultés intellectuelles, et de son éducation* (published 1772). His collected works were published in Paris in 1791 in 14 volumes. Consult: Morley, *Diderot and the Encyclopædists* (London, 1878); Avezac-Lavigne, *Diderot et la société du Baron d'Holbach* (Paris, 1875); Keim, *Helvétius, sa vie et son œuvre* (ib., 1907).

HELVIDIUS PRISCUS. A Roman statesman and Stoic philosopher, of the first century A.D., son-in-law of Thrasea Pætus (q.v.). He was an ardent opponent of the Imperial power. Under Claudius or Nero he was quaestor of Achaëa. He served also in Armenia, to the

great satisfaction of the provincials. Because he eulogized Brutus and Cassius he was banished by Nero in 66, but was recalled by Galba in 68. In 70, as prætor, he opposed Vespasian in various ways, and as a result was banished and presently put to death. For writing a panegyric on Helvidius, Herennius Senecio was put to death by Domitian. Consult: Tacitus, *Dialogus*, 5; Suetonius, *Vespasian*, 15; Pliny the Younger, *Epistles*, vii, 19.

HELVIG, hēlvik, AMALIE VON (1776-1831). A German poet, born Amalie von Imhoff, at Weimar. She received a careful education and traveled much. In 1803 she married a Swedish officer, Karl Gottfried von Helvig, who entered the Prussian service in 1815. Several of her poems were first published by Schiller in the *Musenalmannach*, and her "Abdallah und Balsora" appeared in the *Horen*. She read Greek, and Goethe taught her to use the hexameter, in which she composed the epic *Die Schwestern von Lesbos* (1800). Her other works include a translation of Tegnér's *Frithjofs Saga* (last ed., 1879); the collection *Taschenbuch der Sagen und Legenden* (1812-13), with Karoline de la Motte-Fouqué; and the poems *Die Schwestern auf Coryra* (1812), *Die Tageszeiten* (1812), *Die Sage vom Wolfsbrunnen* (1814), and *Helene von Tournon*. For her biography, consult H. von Bissing (Berlin, 1880).

HELVIVS CINNA, GAIUS. A Roman poet, who lived about 50 B.C. He was a friend of Catullus and was considered by Vergil a poet superior to himself. On the day of the funeral of Julius Cæsar he was killed by the infuriated rabble, which, defeated in its attempt to fire the houses of Brutus and Cassius, encountered him and mistook him for Cornelius Cinna. By the ancient historians who narrate this story, he is called a tribune of the plebeians. The story of his dream as given by Plutarch (*Cæs.* 68) has been introduced by Shakespeare into the drama of *Julius Cæsar* (Act iii, Scene 3). His most highly esteemed work was the *Smyrna*, on which he labored nine years, in true Alexandrian fashion. Its subject was the unnatural love of Smyrna for her own father, Cinyras. Its style is shown by two extant fragments to have been epic. He wrote also a poem entitled *Propempticon Pollionis*. Prior to the publication of the *Æneid*, the *Smyrna* was regarded as the most complete thesaurus of Roman mythology. Consult: Weichert, *Commentationes II de Gaiō Helvio Cinna, Poeta* (Meissen, 1822-23); Kiessling, "De C. Helvetio Cinna Poeta," in "*Commentationes Mommsenianæ*" (Berlin, 1877); Ellis, annotated edition of Catullus (2d ed., Oxford, 1889); Schanz, *Geschichte der römischen Literatur*, § 107 (3d ed., Munich, 1911).

HELVOETSLUIS. See HELLEVOETSLUIS.

HELYAS, HELIAS, or HELIS. See CHEVALIER AU CYGNE; SWAN, KNIGHT OF THE.

HELY-HUTCHINSON, JOHN, BARON HUTCHINSON (1757-1832). An English general, son of John Hely-Hutchinson (1724-94). He was educated at Eton and at Trinity College, Dublin, studied military tactics at Strassburg, and in 1798 was in command at Castlebar when the French landed in Killala Bay; but General Lake succeeded him previous to the flight of the raw Irish troops. Two years after he was appointed a chief of division in Abercromby's army in Egypt and assumed command in the battle of Alexandria when that general was mortally wounded. He succeeded, in spite of disaffection

among his officers, in separating the two superior French forces; then forced the surrender of Cairo (June, 1801), and two months later of Alexandria. For these services he was rewarded with titles and a pension of £2000 a year. In 1813 he was made a general, and on the death of his brother Richard, in 1825, he became second Earl of Donoughmore.

HELY-HUTCHINSON, SIR WALTER FRANCIS (1849-1913). An English colonial administrator, born in Dublin and educated at Harrow and at Trinity College, Cambridge. He was attaché to Sir Hercules Robinson in Fiji (1874) and conducted the negotiations with Thakombau for the cession of Fijian sovereignty to Great Britain; the ability he then showed led to his subsequent advancement. After serving as Private Secretary for Fiji Affairs (1874-75) and for New South Wales Affairs (1875-77), he became Colonial Secretary of Barbados (1877) and chief secretary to the Governor of Malta (1883), where he was Lieutenant Governor for five years (1884-89). He was then appointed Governor of the Windward Islands (1889) and four years later of Natal, where he introduced "responsible government," and of Zululand, to which he annexed the territories across the Pongola (1895). In 1895 he was made Special Commissioner for Tongaland and in 1901 was transferred to the Cape of Good Hope as Governor of Cape Colony.

HELYOT, âlyô', PIERRE (1660-1716). A French Franciscan scholar. He was born and died in Paris and entered the Franciscan convent of the strict observance, 1683. He traveled extensively among the monasteries and after long study produced the masterpiece, which has been the source whence innumerable writers have drawn, *Histoire des ordres monastiques religieux et militaires et des congrégations séculières de l'un et l'autre sexe, qui ont été établies jusqu'à présent* (8 vols., 1714-19); an enlarged edition in four volumes in alphabetic form by Migne, *Encyclopédie théologique*, vols. xx-xxiv, appeared in Paris (1858-59).

HEMANS, FELICIA DOROTHEA (BROWNE) (1793-1835). An English poet, born in Liverpool. She published a volume of juvenile verse in 1808. This was followed with another volume in 1812, in which year she married Captain Hemans, an Irish soldier who had served in Spain. In 1818, after the birth of five sons, she separated from him. She spent the rest of her life in north Wales, in Lancashire, and in Dublin, where she died. Among her works are: *The Forest Sanctuary* (1825), in the second edition of which, published in 1829, first appeared "Casabianca"; *Records of Women* (1828); *Songs of the Affections* (1830); *Hymns for Childhood*; *National Lyrics and Songs for Music*; *Scenes and Hymns of Life* (1834). She also wrote three dull plays and contributed to the magazines. A volume of *Poetical Remains* appeared after her death, and a complete edition of her works, with a memoir by her sister, in seven volumes, in 1839. Mrs. Hemans's verse is sweet, natural, and pleasing, but at moments insipid. Its rhythms are facile, and it lacks depth and force. Still, she was a woman of talent, and, though her zeal for edification was in excess of her poetic faculty, she indubitably performed a useful function in affording a deal of pleasure and consolation to a great many people. Consult: Chorley, *Memorials of Felicia D. Hemans* (London, 1836); *Poetical Works*, with memoir,

edited by W. M. Rossetti (ib., 1873); Espinasse, *Lancashire Worthies* (ib., 1874).

HEM'ATITE (Lat. *hematites*, from Gk. *αἱματῖς*, *haimatitēs*, bloodlike, from *αἷμα*, *haima*, blood), or **SPECULAR IRON**. An iron sesquioxide that crystallizes in the hexagonal system. The specular varieties are crystallized and have a metallic lustre, whence their name. Hematite also occurs in massive fibrous varieties, which have a submetallic or metallic lustre and are brownish red to black in color; while the earthy varieties, known as *red ochre* and *argillaceous hematite*, are red to brownish black in color. It is a valuable ore of iron, containing when pure 70 per cent of that metal, and is widely distributed throughout the world. In North America deposits of great thickness are found in the Lake Superior region, which includes the famous deposits of the Gogebic, Marquette, Menominee, Mesabi, and Vermilion ranges, where the output in 1912 reached a total of 48,211,778 long tons. Deposits at Pilot Knob and Iron Mountain in Missouri were formerly famous, but have not been extensively worked in recent years. See **IRON**.

HEMATEMESIS, **HEMATIN**, **HEMATOXYLIN**, **HEMATURIA**. See **HEMATEMESIS**; **ETC.**

HEM'EL HEMPSTEAD. A market town and municipal borough in Hertfordshire, England, 23 miles northwest of London (Map: England, F 5). Its industries comprise boat making, paper making, straw plaiting, iron foundries, tanneries, and breweries. Its incorporation dates from 1898, and much activity is being shown in public works and improvements. The town owns fine town-hall buildings and a corn exchange and markets, and is reached by a branch of the Midland Railway from Harpenden. Pop., 1901, 11,300; 1911, 12,888.

HEMENWAY, hēm'en-wā, FRANCIS DANA (1830-84). An American Methodist Episcopal theologian. He was born in Chelsea, Vt., graduated from the General Biblical Institute, Concord, N. H., in 1853; and from 1857 to 1861 was principal of the preparatory department of Garrett Biblical Institute, to which institution, after four years in the ministry, he returned as adjunct professor of biblical literature. Appointed in 1870 professor of Hebrew and Biblical literature, he served in this position until his death. He was one of the editors of *The Methodist Hymnal* (1877), contributed the comments on Jeremiah and Lamentations to the *Whedon Series of Commentaries*, and with C. M. Stuart was author of *Gospel Singers and their Songs* (1892). Consult *The Life and Selected Writings of Francis Dana Hemmway*, by Bradley, Patten, and Stuart (Cincinnati, 1890).

HEM'ERALOPIA. See **SIGHT**, **DEFECTS OF**.

HEMEROBAPTISTS (from Gk. *ἡμεροβαπτιστής*, *hēmerobaptistēs*, from *ἡμέρα*, *hēmera*, day + *βαπτίζω*, *baptistēs*, baptist, from *βαπτίζω*, *baptizein*, to baptize). A sect of Jews mentioned by Eusebius (*Hist. Eccl.*, iv, 22) on the authority of Hegesippus, by Epiphanius (*Hær.* 17), and Justin Martyr in the *Dialogue with Tryphon*. Their distinguishing feature seems to have been the daily ablution. According to Tosefta, *Jadajim* II, Palestinian Talmud, *Berakhoth* III, 6 c, and Babylonian Talmud, *Berakhoth* 22 a, there was a Jewish sect called *Tobhile shaharith*, or 'those who immersed themselves in the morning,' distinct from the Pharisees. Justin Martyr designates them as Baptists; Hegesippus in Eusebius (l. c.) as

Hemerobaptists. Epiphanius distinguishes them from the "scribes and the Pharisees." In the Clementine Homilies (II, 23) John the Baptist is referred to as a Hemerobaptist. Pseudohieronymus (*Indicibus*, I, 10), Honorius (*De Haeresibus*, viii), and Isidore of Spain (*Origines*, viii, 4, 10) speak of these Jewish Hemerobaptists. The custom seems to have been widely practiced among the Jews of West Africa (Tertullian, *De Baptismo*, 15). According to the Clementine Homilies (x, 1; xi, 1) Peter immerses himself daily before the morning prayer; and it is not improbable that the custom passed from a Jewish sect to a Christian. It evidently had a religious significance, as it "cleansed from all guilt" (Epiphanius, *Hær.* xvii, 1). Consult: Oehler, *Corpus hæresilogicum* (Berlin, 1856); Preuss, *Wiener medizinische Wochenschrift* (Vienna, 1904); Krauss, *Bad und Baderwesen in Talmud* (Frankfort-on-the-Main, 1908); Brandt, *Die jüdischen Baptismen* (Giessen, 1910).

HEM'EROCAL/LIS. See **DAY LILY**.

HEM'IANOP'SIA, or **HEMIANOPIA**. See **HEMIOPIA**.

HEM'ICEL/LULOSE. A name applied to substances making up a portion of ordinary cell walls and wood walls of plants and composing almost entirely the endosperm of many seeds (date palm, button palm, *Iris*, etc.). Hemicellulose includes a number of different chemical substances and differs from cellulose in certain important characters. It is readily hydrolyzed by dilutions of mineral acids that will not affect cellulose. Upon hydrolysis hemicellulose produces various proportions of mannose, galactose, xylose, or arabinose; while cellulose produces only glucose. Hemicellulose is not soluble in Schweitzer's reagent (ammoniacal copper sulphate), which is an excellent solvent for cellulose; and it is far more commonly digested by the cytases than is cellulose.

HEMICHORDA, hēm'i-kōr'dā. Same as *Adelochorda* (q.v.). See **BALANOGLOSSUS**; **CHORDATA**.

HEMICIDARIS, hēm'i-sid'ā-ris. One of the common genera of Mesozoic echinoids, appearing in the Permian and ranging through the whole Mesozoic era. It is characterized by its thick-shelled spheroidal form, the narrow ambulacra with numerous plates near the ambulacral system, and two rows of small tubercles, while the broad ambulacra bear two rows of very large tubercles. See **ECHINOIDEA**.

HEM'ICRA'NIA (Lat., from Gk. *ἡμικρανία*, *hēmikrania*, pain on one side of the head, from *ἡμι*, *hēmi*, half + *κρανίον*, *kranion*, skull). A headache affecting one side of the head. See **HEADACHE**; **MIGRAINE**.

HEMICYCLE (Gk. *ἡμι*, *hēmi*, half, and *κύκλος*, *kyklos*, circle). A semicircular seat, used as a convenient resting place or for a group meeting for conversation or discussion; called also *esedra*.

HEMICYCLE, THE. A painting by Paul Delaroche (q.v.) on the wall of the amphitheatre at the Ecole des Beaux-Arts, Paris.

HEM'TEP'IPHYTE. See **EPIPHYTE**.

HEMIGALE, hē-mig'a-lē (Neo-Lat., from Gk. *ἡμι*, *hēmi*, half + *γαλή*, *galē*, weasel). An East Indian weasel-like civet (*Hemigalea hardwickei*), about the size of an ichneumon, and grayish brown, with six or seven dark wide stripes across the back. It feeds on eggs and small animals.

HEMIMETABOLIC INSECTS (from Gk. *ἡμι-, hēmi-,* half + *μεταβολή, metabolē,* transformation, from *μεταβάλλειν, metaballein,* to transform, from *μετά, meta,* after + *βάλλειν, ballēin,* to throw). Insects that have a partial or incomplete metamorphosis. There are often very great differences between the habits and the structure of the young and the adults. For example, in the case of the cicadas, the larvæ live in the ground and have forelegs fitted for burrowing, while the adults, which appear only after a period of pupation, fly about and rest in herbage. In other forms, such as dragon flies, the larvæ are aquatic and have tracheal gills, while the adults are winged and have open trachea. The orders of the hemimetabolic insects are: Plecoptera, or stone flies; Isoptera, white ants or termites; Corrodentia, psocids and book lice; Mallophaga, bird lice; Euplexoptera, earwigs; Hemiptera, cicadas, chinch bugs, squash bugs, bedbugs, plant lice, etc.; and Orthoptera, grasshoppers, crickets, and walking sticks. Fossil insects belonging to this group have been found in Illinois, Pennsylvania, and Colorado. See METAMORPHOSIS.

HEMI'NA, LUCIUS CASSIUS. A Roman annalist who lived about 145 B.C. and wrote a history of Rome from the founding of the city to the end of the Third Punic War (Pliny, *Historia Naturalis*, xiii, 84; xxix, 6). Though the work is frequently cited by Pliny, Nonius, and Aulus Gellius, only a few fragments are preserved. These are given in Peter, *Fragmenta Historicorum Romanorum* (Leipzig, 1883). Consult also Peter, *Veterum Historicorum Romanorum Reliquiæ*, vol. i (Leipzig, 1870; 2d ed., 1914).

HEM'ING, JOHN. Coeditor with Condell of the first folio of Shakespeare. See CONDELL, HENRY.

HEM'IO'PIA, HEM'IANO'PIA, or HEM'IANOP'SIA (Neo-Lat., from Gk. *ἡμι-, hēmi-,* half + *ὤψ, ōps,* eye). A disorder of sight, consisting in loss of vision for corresponding halves or sections of the visual field. It depends upon the arrangement of the nerve fibres running from the brain through the optic nerves to the eyes. The fibres coming from each half of the brain, through the optic tracts, meet at a point called the optic chiasm, where some fibres cross over to the optic nerve of the opposite side and some go to the eye of the same side. From the way in which this crossing and subsequent arrangement of the fibres takes place, the right halves of both retinae, and so the left halves of both visual fields, are supplied from the right half of the brain through the right optic tract. An affection of one optic tract will therefore cause loss of vision in the corresponding half of each retina, and so loss of the field of vision of the opposite side. This is homonymous or lateral hemiopia. A lesion in the chiasm destroying all the crossing fibres causes loss of vision in the outer half of the field of both eyes, bitemporal hemiopia, known, together with a possible loss of the inner field of both eyes, as crossed hemiopia.

HEM'IPLE'GIA (Neo-Lat., from Gk. *ἡμιπλήξ, hēmiplēa,* smitten on one side, from *ἡμι-, hēmi-,* half + *πλήσσειν, plēssein,* to strike). Paralysis (q.v.) limited to one side of the body. In some cases part of the face is also involved, if the cause of the paralysis affects the origin or the course of the facial nerve. The cause is usually a hemorrhage within the brain cavity, i.e., apo-

plexy (q.v.), or a collection of fluid, or a tumor. Because of the fact that about 90 per cent of the fibres in the pyramids of the brain pass to the opposite side of the body (see NERVOUS SYSTEM), the paralysis occurs on the opposite side of the body from the site of the lesion in the brain, unless the lesion is situated below the decussation of the fibres. While the motor nerves are principally affected, the nerves of sensation are also more or less involved. Besides the causes named, epilepsy, hysteria, and chorea may also operate to cause hemiplegia, which in these cases is temporary. The treatment varies with the cause and must always be under a physician's direction. Stimulants should never be administered to a paralyzed patient unless ordered by a physician. The prognosis varies according to the cause. If hemiplegia is due, as it very frequently is, to apoplexy, the first attack may terminate in more or less complete recovery; but even then subsequent attacks are likely to occur.

HEM'IPODE (Gk. *ἡμιπους, hēmipous,* half-footed, from *ἡμι-, hēmi-,* half + *πούς, pous,* foot). A book name for certain gallinaceous birds, usually regarded as forming a single family (Turnicidæ), in the order Hemipodii, distinguished by a slender beak and by the want of a hind toe. They are especially notable because all of the vertebrae remain distinct instead of being extensively ankylosed, as is usual in birds. The palate is like that of the Passeres, and Huxley and some other systematists have placed them in a separate order, the Hemipodii or Turnicomorphæ. They are the smallest of gallinaceous birds and inhabit cultivated grounds and sterile sandy plains in warm countries. There are about 25 species, in two genera. See BUTTON QUAIL; ORTYGAN.

HEMIPTERA (Neo-Lat. nom. pl., from Gk. *ἡμι-, hēmi-,* half + *πτερόν, pteron,* wing). An order of insects sometimes called Rhynchota, including the bugs, and comprising the suborders Homoptera and Heteroptera. The name "Hemiptera" was suggested by the appearance of the first pair of wings, the proximal half of which in many of the species (suborder Heteroptera) is thickened much like that of beetles. The wings of the suborder Homoptera, when present, are of equal thickness throughout. The mouth parts of the Hemiptera are fitted for sucking, and the young undergo incomplete metamorphosis. The order is one of the most destructive to agriculture of all the insects. A few of the forms are useful in the economy of plants and man, for certain species prey upon injurious insects, while the species producing cochineal and wax furnish materials of commercial value. The injurious species include the loathsome lice and bedbugs, red bugs which do much damage to the cotton and orange crops, the destructive chinch bug, plant lice, scale insects, etc.

Fossil Hemiptera. The oldest-known fossil insect, represented by a fragmentary wing of hemipteran relations, was found in the Upper Ordovician shales of Sweden. The earliest fossil bugs that have the mouth parts preserved have been obtained from Carboniferous rocks and show these parts to have been, at that early period, of the highly specialized lancet form characteristic of the order—an indication of the very early evolution of the type. The scale insects and mealy bugs (Coccidæ), the harvest flies (Cicadidæ), lantern flies (Fulgoridæ), and

tree hoppers (Membracidae) have their fossil ancestors in the Tertiary rocks. Some of the Heteroptera, such as the water bugs, appear in the Jurassic. Chinch bugs, squash bugs, and bedbugs appear in the Liassic and Tertiary.

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HEMIRAMPH (from Gk. ἥμι-, *hēmi*-, half + ῥάμφος, *rhāmphos*, snout). A fish of the family Hemirampidae. See HALFBREAR.

HEM/LING, HANS. A Flemish painter, more correctly MEMLING (q.v.).

HEMLOCK (AS. *hemlic*, *hymblicæ*, hemlock), *Conium*. A genus of umbelliferous plants, the members of which have compound umbels of small white flowers. The best-known and only important species is the common, or poison, hemlock (*Conium maculatum*), which grows by waysides on heaps of rubbish and in other similar situations throughout Europe, in some parts of Asia, and naturalized in North America and Chile. It has a root somewhat resembling a small parsnip; a round, branched, hollow, bright-green stem, 2 to 7 feet high, generally spotted with dark purple; large tripinnate, dark shining green leaves with lanceolate pinnatifid leaflets. The whole plant has a nauseous smell, particularly if rubbed or bruised. The leaves and fruits are employed in medicine. The leaves should be gathered just before the time or at the commencement of flowering, and after the removal of the larger stalks they should be quickly dried by a heat not exceeding 120°. As, however, they sometimes yield little or none of the active principles in the plant, the fresh leaves are preferred. The whole plant contains the active principle, coniine, and many fatal cases of poisoning have been attributed to eating the roots under the mistaken idea that they were parsnips.

The uses of hemlock in medicine are few and unimportant and depend chiefly upon its action upon the motor nerves, beginning with their end organs. Although large doses cause complete paralysis by their action upon the peripheral nerves, sensation and consciousness are not affected; death finally occurs by extension of the paralysis to the muscles of respiration. In large or poisonous doses it sometimes gives rise to coma and sometimes to convulsions or violent delirium. Among the ancient Greeks poisoning by hemlock was a common mode of death for condemned criminals. It is generally claimed the juice of the common hemlock was used, but some claim the water hemlock was the plant thus employed. The strength of its preparations is very variable, as its active principles are volatile. Practically the only use of the drug is in tetanus, hydrophobia, strychnine poisoning, and other convulsive disorders. Even in these it is rarely used, and only to prevent exhaustion by lessening muscular contractions. Water hemlock, or cowbane (*Cicuta virosa*), is also an umbelliferous plant, found growing in ditches, the margins of ponds, and wet grounds

in Europe and the north of Asia. It has a large fleshy white root, covered externally with fibres; an erect much-branched stem, 2 to 5 feet high; tripinnate leaves, with linear-lanceolate regularly and sharply serrated leaflets, and white flowers. It is a virulent narcotic acrid poison. Cicuta, in Latin, seems to have been the name of the same plant called *coneion* by the Greeks, but it is not known whether this or the previous plant was so denominated. (See CONTINE.) Another species, *Cicuta maculata*, is common in North America, growing in many places. It has a spotted stem, like that of true hemlock, the name of which it very generally receives in North America. The leaves are triternate, the leaflets ternate. It is a very poisonous plant and is the cause of many deaths.

HEMLOCK TREE, or **HEMLOCK SPRUCE**. A name applied to the coniferous trees which belong to the genus *Tsuga*, especially to *Tsuga canadensis*. This is a large, graceful tree, with much the habit, and appearance of some spruces. It is found from Nova Scotia to Alabama and Georgia and west to Wisconsin and Minnesota. The leaves are half an inch long, bright green above and silvery beneath. The cones, which have few thin bracts, are scarcely longer than the leaves. The wood, light, soft, brittle, and light red in color, is extensively used in building. It warps badly when exposed. The bark is largely employed in tanning leather, for which purpose it is preferred and more extensively used than any other American product. Hemlock oil is distilled from the branches and leaves, and pitch is obtained from the trees. There are numerous cultivated varieties which are very ornamental, especially while the trees are young. *Tsuga caroliniana* is a second species, which occurs locally in Virginia, North Carolina, and Georgia. Two species are found on the Pacific coast from Alaska to California—*Tsuga mertensiana*, a tree 70 to 100 feet tall, and *Tsuga heterophylla*, a somewhat larger tree that attains its greatest size in Washington and Oregon. The wood of the last species is stronger and more durable than that of any other American hemlock, and it is largely manufactured into lumber for construction purposes. This species is extensively planted as an ornamental tree in Europe. Other species are found in Asia. See SPRUCE.

HEM/METER, JOHN COHN (1864—). An American physician, born in Baltimore, Md., and educated in Germany, at the Baltimore City College, the University of Maryland (M.D., 1884), and Johns Hopkins University (Ph.D., 1890). At the University of Maryland he was appointed professor of physiology, clinical professor of medicine, director of the physiological laboratory, and regent of the medical department. A specialist in diseases of the digestive organs, he was at one time president of the American Gastro-Enterologic Association, became associate editor of several American and foreign medical journals, and published, among other works, *Diseases of the Stomach* (3d ed., 1902); *Diseases of the Intestines* (2 vols., 1901-02); *Manual of Practical Physiology* (1912).

HE/MODY'NAMOM/ETER. See HEMO DYNAMOMETER.

HE/MOGLO'BIN. See HEMOGLOBIN.

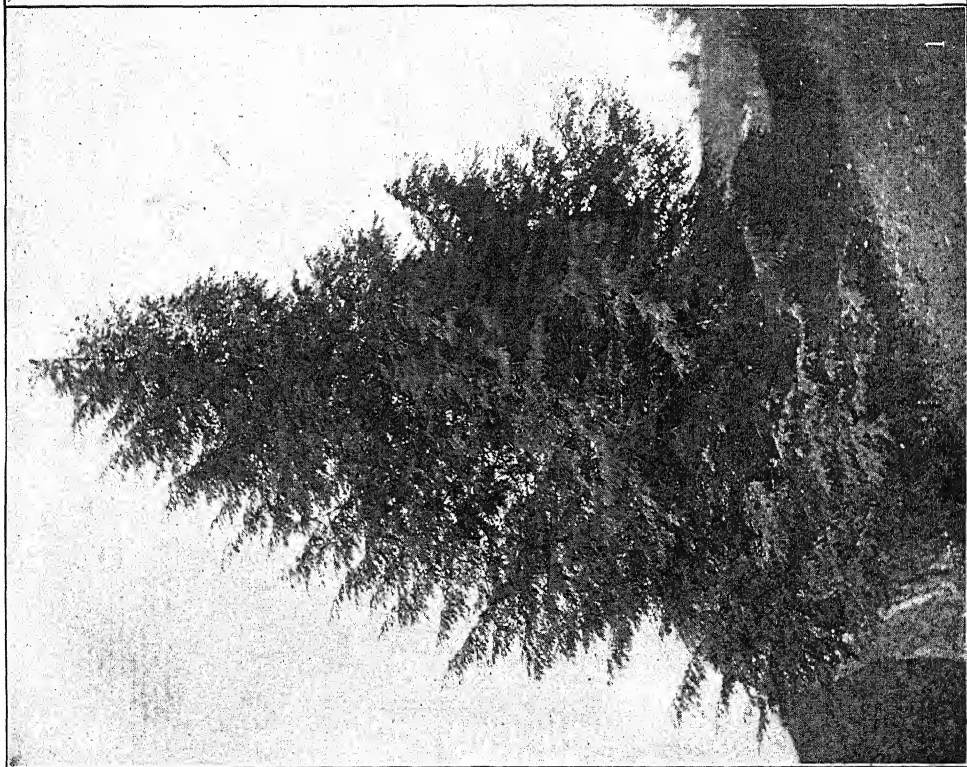
HE/MOGLO'BINU'R/IA. See HEMATURIA.

HE/MOPHI/LA. See HEMOPHILIA.

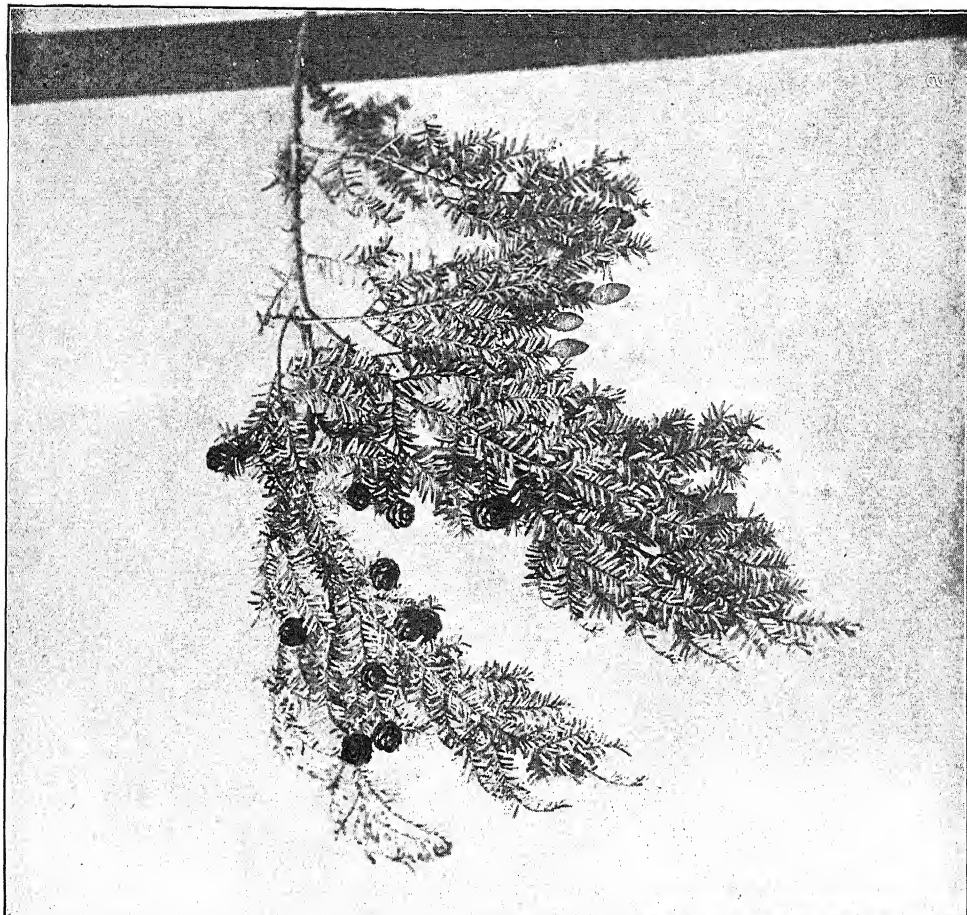
HEM/ORRHAGE. See BLEEDING.

HEM/ORRH/OIDS. See PILES.

HEMLOCK



1. TREE SHOWING FORM OF GROWTH



2. SPRAY SHOWING CONES

HEMP (AS. *henep*, OHG. *hanaf*, *hanof*, Ger. *Hanf*; connected with Lat. *cannabis*, Gk. *kánnabís*, *kannabis*, OChurch Slav. *konoplya*, Lith. *kanapės*, hemp, and probably with Skt. *śana*, hemp), *Cannabis sativa*. A fibre plant of the natural order Urticaceæ (q.v.), which has the male and female flowers on different plants. There is only one known species of the genus, which varies considerably, however, in different soil, climate, and cultivation. It is an annual, a native of the warmer parts of Asia, but has been cultivated in Europe from the earliest historic times and is now naturalized in many parts of Europe and America. Like flax, it adapts itself to diversities of climate, but is, however, readily injured by frost, particularly when young. In many countries it succeeds only because the summer is sufficiently long for its whole life. Hemp varies from 3 or 4 to 15 or even 20 feet in height, according to the soil and climate. It is sometimes used as an ornamental in shrubberies and large flower borders. The stem is erect, more or less branched; the leaves are five to nine fingered, the flowers yellowish green, small, and numerous. The stem is hollow or filled with a soft pith, surrounded by a tender brittle substance, consisting chiefly of cellular tissue, with some woody fibre, which is called the reed, boon, or shive of hemp. Over this is the thin bark, composed chiefly of fibres extending parallel with the stalk, with an outer membrane or cuticle. The female plants are taller and stronger than the male.

Hemp is cultivated for its fibre in almost all countries in Europe; most extensively in Russia, Italy, and Austria-Hungary. Russia produces about 1,000,000,000 pounds, or two-thirds of the world's annual production of fibre. French hemp is much esteemed in the market, as is also that of England and Ireland, of which, however, the quantity is comparatively inconsiderable. The United States produces about 7,500,000 pounds of hemp fibre annually, valued at about \$500,000, which is practically all grown in Kentucky, though some is produced in California, Illinois, and Nebraska. The production has been greatly reduced in the last 30 or 40 years, owing to the introduction of Manila hemp and jute. In British India, however, production increased from 15,000,000 pounds in 1889 to about 75,000,000 pounds in 1909. Limestone soils and alluvial soils are best adapted to this plant. It is very necessary to have the soil so rich, and to sow the seed at such a season, that the plants shall grow rapidly at first, as they thus form long fibres. Hemp sown thinly produces a coarser fibre than that sown thickly. It is not considered an exhaustive crop when the leaves of the plant and the shive, or boon, are returned to the land. As with flax, a thorough preparation of the soil is necessary. With the ground well prepared there is little trouble with weeds, as hemp occupies the entire ground. The crop is ready to cut when the first seeds are ripe, or about 100 days from planting. Cutting is done with a knife or a heavy mower. The treatment of hemp by "retting," etc., is similar to that of flax (q.v.). It is usually dew-retted by spreading evenly over the ground to rot out the gums that hold the filaments together. The hemp stalks are afterward decorticated by hand beating or machinery and cleaned from the fibre by "hackling." The fibre is tied up into "hands" and baled. The average yield of hemp fibre is about 1000 pounds per acre. The fibre of hemp

is generally used for coarser purposes than that of flax, particularly for sailcloth, pack sheet, ropes, and the calking of ships.

The seed of hemp is produced in great abundance. It is commonly sold as food for cage birds; and birds are so fond of it that not only the ripening fields, but the newly sown ground, must be carefully guarded against their depredations. Hemp is cultivated in warm countries for a resinous secretion which has narcotic or intoxicating qualities. In India the resin is commonly known as churrus, or charras. See HASHISH.

While, strictly speaking, the name "hemp" belongs to the plant *Cannabis sativa*, by common usage it is now applied to other fibre plants that in a great measure supply the uses once filled by common hemp alone. These are designated as bowstring, Manila, sisal, and sunn hemp (see below). Many lesser-known fibre plants pass under the general name of hemp, though they vary widely in their botanical aspects and relations. Consult S. S. Boyce, *Hemp: A Practical Treatise on the Culture of Hemp, with the History and Nature of the Hemp Plant* (New York, 1912).

HEMP, BOWSTRING. The fibre produced by *Sansevieria* spp., a genus of Liliaceæ with representatives in tropical regions of both hemispheres. The employment of the fibre for making bowstrings led to this name. The plants are stemless perennials which grow wild in the jungles and increase by runners. The leaves, which yield readily to treatment in the fresh state, are thick and fleshy, sword or lance shaped, and rich in fine lustrous fibre which ranges from 2½ to 7 feet in length, does not rot readily in water, and by experiment has been found to be the strongest and best-fitted fibre for deep-sea sounding. The plant, which is propagated readily from cuttings, requires a good rich soil in which under favorable conditions it will reach its full growth in one year. Ordinarily, however, it does not acquire its full size until the second season, and some species do not yield a crop until the third year. When once the land is stocked with it, a full crop may be expected from the roots within 12 months after cutting. It does not appear to exhaust the soil materially and will continue to make vigorous growth for a number of years in the same place. The yield is about 50 pounds of fibre per ton of green leaves, or from 2 to 2½ tons of fibre per acre annually.

HEMP, INDIAN. See HASHISH.

HEMP, MANILA, or ABACA. The fibre of a species of plantain or banana (*Musa textilis*), a native of the Philippine Islands, where it is extensively cultivated. It is most widely grown in the southern part of Luzon and less extensively on the islands of Samar, Leyte, Cebu, and Mindanao. The fibre is white, easily separated, and very tenacious. The harder and stronger outer fibre is used for cordage, the finer inner fibres for weaving delicate fabrics, and the intermediate layers for manufacture of web cloths and gauzes. From the finer sorts of the fibre, veils, crapes, robes, and women's hats of great beauty are made; also various articles of men's wear, as shirts and suitings of remarkable durability. Manila hemp is largely used in the United States for making binding twine and cordage. Manila cordage is now used for every purpose for which rope is employed. The best conditions for the growth of abaca are soil

fertility, wind protection, and abundant moisture, with good drainage. The finest growth is obtained on the slopes of the volcanic mountains. A new plantation is generally made of young shoots, which very quickly throw out suckers. Occasionally the plants are raised from seed. Cultivation consists in keeping down weeds and undergrowth and in loosening the soil by means of hoes and cultivators. As soon as the plants occupy the entire space, weed and other growth is much reduced. Plants raised from year-old seedlings need at least two years, while those raised from suckers require four years, before they will produce fibre of value.

The abaca is cut just before flowering, near the roots, split open longitudinally, and the central peduncle separated from the sheathing layers of fibre. The fibrous coats are dried two or three days in the shade and are then scraped until only the fibres remain. Two natives will cut and scrape about 25 pounds of the fibre in a day. The average yield is about 1000 pounds of good-grade fibre per acre annually. The output of abaca is fairly uniform under natural conditions. The exports from the islands during the last years of the Spanish régime averaged about 100,000 tons annually, but since then they have reached 175,000 tons in a single year. The value of the crop exported in 1913 was \$23,045,000. Attempts have been made to develop its production in the Hawaiian Islands, but the quantity produced thus far is comparatively small. Consult *Philippine Bureau of Agriculture, Farmers' Bulletin No. 12* (Manila, 1910).

HEMP, SISAL. The fibre of *Agave sisalana*, order Amaryllidæ, native of Yucatan, Mexico, Central America, and West Indies, and closely related to the century plant. It has been introduced into the Bahamas and Florida. As a cordage fibre, it is second only to Manila hemp in strength. Its straight smooth strands of fibre become white upon drying without washing. The plants yield best on a gravelly, rocky soil in comparatively arid districts only a few feet above the level of the sea. It thrives upon the Florida Keys, upon the almost naked coral rock, but will not thrive when even slightly shaded. Plants set out at 18 inches high from the nursery will produce leaves fit for cutting in three years. The life of a plant when undisturbed is six or seven years, after which it sends up its blossom stalk and then dies. Cutting, however, extends its life 15 to 20 years. No special cultivation is needed except that the land be kept clean and the suckers kept down. The cutting of the leaves is done in Yucatan by Indians, who use a heavy-bladed, sabre-like knife called a machete. The spine at the leaf end is cut off, and the leaves bundled for removal to the machines. On large plantations they are transported by steam power over tramways which reach different parts of the estate. The fibre is separated from the fresh leaf by a specially constructed machine called a raspador. The annual yield of fibre is from 1000 to 1500 pounds per acre, 50 to 70 pounds of fibre being derived from 1000 leaves. Sisal hemp is largely used in the United States in the manufacture of ropes and binder twine, the imports of 1913 being 154,000 tons valued at \$17,804,000. See **HENEQUEN**.

HEMP, SUNN. The fibre derived from the bark of *Crotalaria juncea*, order Leguminosæ, a native of India. The plant has been in cultiva-

tion from time immemorial upon the high, sandy lands less suited for the more exacting crops. Seed is generally sown in April or May, and in August the plant, if grown for its fibre, is pulled or cut close to the ground, laid in long rows till the leaves begin to rot and separate from the stalks, which are then steeped in water for a few days, till the bark separates freely. The average yield is about 640 pounds of fibre per acre. The fibre is not so strong as hemp, but good cables, canvas, and cloth are made of it. It is now exported in considerable quantity and is known by various names, as brown hemp, Bengal hemp, etc. Jubbulpore hemp (*Crotalaria tenuifolia*) is considered by some authorities to be a variety of *Crotalaria juncea*. See **CROTALARIA**.

HEMP AGRIMONY. A European medicinal plant. See **EUPATORIUM**.

HEMPEL, CHARLES JULIUS (1811-79). An American homœopathist. He was born at Solingen in Prussia and was educated there, at the University of Paris, and, after coming to the United States (1835), at New York University. In 1857 he became professor of materia medica at the Hahnemann Medical College in Philadelphia and later practiced at Grand Rapids, Mich., where he died. A man of considerable literary ability, Hempel, who when a student in Paris had assisted in the preparation of Michelet's *Histoire de la France*, published translations of Hahnemann's *Chronic Diseases* (5 vols., 1846) and of Jahr's *Mental Diseases* (1853), as well as other homœopathic manuals. His most important works, however, were: *A System of Materia Medica and Therapeutics* (1859); *The Science of Homœopathy* (1874); and among several miscellaneous studies, *Christendom and Civilization* (1840).

HEMPEL, FRIEDA (1885-). A German coloratura soprano, born at Leipzig. After completing the course in piano at the Leipzig Conservatory, she studied singing for three years under Nicklas Kempner in Berlin. She made her début as the Queen in "The Huguenots" at the Royal Opera in Berlin in August, 1905. For the next two years she was engaged at the Schwerin Opera, returning to Berlin in 1907. Her reputation soon spread over all Europe, so that she was in constant demand for "guest" appearances in the principal cities. In 1912 she joined the Metropolitan Opera Company, New York, between seasons resuming her place in Berlin. Her voice is of beautiful and remarkably even quality, wonderfully flexible and vibrant. Her vocal technic is well-nigh flawless.

HEMPHILL, JOSEPH NEWTON (1847-). An American naval officer. He was born at Ripley, Ohio, and graduated from the United States Naval Academy in 1866. He was regularly promoted through the various lower grades and became captain in 1901 and rear admiral in 1906. He served on the *Monongahela* when it was wrecked by the West Indian earthquake in 1867 and was at Manila during the Philippine outbreak and at Venezuela at the time of the Andrade-Castro revolution. He commanded the *Kearsarge* in 1902-04, was captain at the New York Navy Yard in 1904-06, served as president of the Board of Inspection and Survey in 1906-07 and of the Naval Examining and Retiring Boards in 1908-09, and was commander in chief of the Asiatic station and squadron in 1907-08. He retired in 1909.

FIBRE PLANTS



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JULIUS BIEN & CO. LITH. N.Y.

1 RAMIE - *BOEHMERIA NIVEA*

2 JUTE - *CORCHORUS CAPSULARIS*

3 BOWSTRING HEMP - *SANSEVIERIA ZEYLANICA*

4 HEMP - *CANNABIS SATIVA*

5 COTTON - *GOSSYPIMUM HERBACEUM*

HEMPL, GEORGE (1859-). An American philologist, born at Whitewater, Wis. In 1879 he graduated from the University of Michigan, with which he was connected as a teacher from 1889 to 1906, for the last nine years as professor of English philology and general linguistics. Immediately after his college course he had been a principal of high schools, and had then studied abroad (1886-89) at several German universities, receiving his Ph.D. from the University of Jena. In 1906 he accepted the professorship of Germanic philology at Leland Stanford Junior University. He served as president of the American Dialect Society in 1900-05, of the Modern Language Association of America in 1902-03, and of the American Philological Association in 1903-04. Besides his articles on archæology, pedagogy, and philology, he is author of *Old-English Phonology* (1892); *Chaucer's Pronunciation* (1893); *German Orthography and Phonology* (1897); *English Nursery Rimes in German* (1898); *Phonetic Text of Wilhelm Tell* (1900).

HEMP PALM (*Trachycarpus excelsa*). A palm of China and Japan, the fibre of the leaves of which is much employed in those countries for making cordage and for mats. Hats are also made of its leaves, and even cloaks and other garments for wet weather. See CHAMÆROPS.

HEMPSEED OIL (*oleum cannabis*). An oil obtained from the seeds of the *Cannabis sativa*, or common hemp. It has a mild odor, nauseating taste, and a greenish-yellow color which turns to brown with age. Its specific gravity at 15° C. is 0.9276. It is freely soluble in boiling alcohol. It has weaker drying properties than linseed, for which it is sometimes used as a substitute in making paints and varnishes. It is also used in soap manufacture. The seeds contain about 30 per cent of oil.

HEMPSTEAD. A village in Nassau Co., N. Y., about 20 miles east of New York City, on the Long Island Railroad (Map: New York, B 3). Its principal interests are in farming and market gardening. The village is a popular suburb of New York and has the Turner Institute, a public library, and two parks. During the Spanish American War Camp Black was established near here for State troops. The water works are owned by the municipality. Hempstead was settled by New Englanders in 1643. The Presbyterian church, organized the following year, claims to be the oldest Presbyterian society in the country. The Episcopal church owns a communion service presented by Queen Anne. Pop., 1900, 3582; 1910, 4964. Consult Onderdonk, *The Annals of Hempstead, 1643-1832* (Hempstead, 1878).

HEMPSTEAD. The county seat of Waller Co., Tex., 51 miles northwest of Houston, on the Houston and Texas Central Railroad (Map: Texas, E 4). It is an important shipping point, especially for garden truck, being situated in a farming and cotton-growing region, and has cotton gins, cottonseed-oil mills, pickling vats, etc. Pop., about 2000.

HEMPSTEAD PLAINS. A prairie on Long Island, N. Y., remarkable for being the only one east of the Alleghanies and interesting on account of its proximity to New York City. It is situated in the central part of Nassau County, around and between Hempstead and Hicksville, and originally covered about 50 square miles. About four-fifths of the area is now occupied by farms and villages, leaving 8 or 10 square

miles of native vegetation to represent its primeval condition.

The surface is essentially level, except for a gentle slope to the south and a few broad shallow valleys, most of which contain no permanent streams. The soil is about a foot of brownish sandy loam, resting on coarse gravel, which is believed to be an outwash from the glacial moraine immediately north of it, and its natural productivity is much less than that of neighboring areas which were originally wooded. The native vegetation, outside of the deeper valleys, consists of a few scattered trees and shrubs, and about 60 species of herbs, of which broom sedge (a coarse grass) is the most abundant.

In Colonial days the area was public property and used mostly for pasturage, farming being a later development. More recently it has been a favorite place for equestrian sports, automobile races, and aeroplane flights, all of which are favored by the level topography and the scarcity of trees. The suburbs of New York are constantly encroaching on it.

The scarcity of trees here, as in the case of the great western prairies, has never been fully explained. For a more extended description, consult *Bulletin of the American Geographical Society* (New York, May, 1911).

HEMS. A city in Asiatic Turkey. See HOMS.

HEMSTERHUIS, hêm'stêr-hois, FRANZ (1721-90). A Dutch writer on moral philosophy and æsthetics. He was born at Groningen, the son of Tiberius Hemsterhuis, studied at the University of Leyden, and held a subordinate place in the Council of State of the United Provinces. He also devoted himself to literature and art and especially to philosophy and is classed with the sentimentalists of the eighteenth century. His chief works are: *Lettre sur la sculpture* (1769); *Lettre sur l'homme et ses rapports* (1772); *Alexis, ou sur l'âge d'or* (1787; Ger. trans. by Jacobi, 1787); *Des facultés de l'âme* (1791).

HEMSTERHUIS, TIBERIUS (1685-1766). A celebrated Dutch scholar. He was born at Groningen, studied at the university there, and in 1704 was appointed professor of mathematics and philosophy at Amsterdam. In 1717 he was made professor of Greek at Franeker, although he did not take up his residence there until three years later. In 1740 he received a call to the University of Leyden, where he remained until his death. One of the greatest Greek scholars of his time, he may be said to have created a new school of Greek philology, to which belong his distinguished pupils Ruhnken and Valckenaer. His editions of the *Onomasticon* of Pollux (2 vols., 1706), of the *Colloquia* of Lucian (1708 and 1732), and of the *Plutus* of Aristophanes (1744) are his principal literary works. From Hemsterhuis' manuscripts, *Anecdota Hemsterhusiana* (1825) have been edited by Geel, and *Orationes et Epistolæ* (1839) by Friedmann. Consult: Ruhnken, *Elogium T. Hemsterhusii* (Leyden, 1768; reprinted in the *Bibliotheca Teubneriana*); Lindemann, *Vita Duumvrorum T. Hemsterhusii et D. Ruhnkenii* (Leipzig, 1882); Müller, *Geschichte der klassischen Philologie in den Niederlanden* (ib., 1869); Sandys, *A History of Classical Scholarship*, vol. ii (Cambridge, 1908).

HEN. See FOWL.

HÉNAULT, à'nô', CHARLES JEAN FRANÇOIS (1685-1770). A French historian. He became president of the *cour d'enquêtes* in 1710 and member of the French Academy in 1723. Later

he was the head of the household of Maria Leszczyńska, wife of Louis XV. He wrote much light and graceful verse and some mediocre plays, but is best known for his excellent *Abregé chronologique de l'histoire de France* (1744), an attempt at a general history of France. His *Mémoires* (1855) are of value mainly because they contain interesting anecdotes of men of note in his day.

HENBANE (*Hyoscyamus*). A genus of solanaceous plants, the members of which are mostly annual and biennial herbs, natives of the Mediterranean region. The common henbane (*Hyoscyamus niger*) is not uncommon in waste places in the neighborhood of towns and villages in Europe, northern Africa, Asia, and as an escape in the eastern United States. It is also cultivated to some extent. It is an annual or biennial, somewhat bushy, 1 to 4 feet high, with large sinuated or sharply lobed leaves without leafstalks, and large, dingy yellow flowers, with brownish-red or purple veins. The whole plant is covered with clammy hairs and has a nauseous smell, which gives warning of its strong narcotic, poisonous quality. Cases of poisoning by henbane are not rare, since its root somewhat resembles small parsnips. The seeds contain in largest quantity the peculiar alkaloid hyoscyamine, on which the properties of the plant chiefly depend. The symptoms of poisoning by henbane are similar to those produced by other narcotic poisons, and the proper treatment is the same as in cases of poisoning by opium. In medicine the leaves are commonly used externally. They are gathered and quickly dried when the plant is in full flower. Fomentations of henbane are applied to painful glandular swellings, parts affected with neuralgia, etc., and are often found to afford relief. Their action is almost the same as that of belladonna, and tincture and extract of henbane are often administered in cases of annoying cough, spasmodic asthma, and other diseases that seem to demand sedatives and antispasmodics. Henbane is also employed to calm mental irritation and to induce sleep. For many cases it has one great advantage over laudanum in not producing constipation. The other species of henbane possess similar properties. In Greece the dried stalks of *Hyoscyamus albus* are smoked to allay toothache.

HENCKE, hēnk'e, KARL LUDWIG (1793-1866). A German astronomer, born at Driesen, where he was long postmaster. He discovered the planetoids Astræa (1845) and Hebe (1847) and contributed some additions to previous lists of stellar magnitudes to Peter's *Zeitschrift für Astronomie* (1860) and the *Monthly Notes of the Astronomical Society* (1859).

HENCKELL, hēnk'el, KARL FRIEDRICH (1864-). A German author. He was born in Hanover and studied at the universities of Berlin, Heidelberg, Munich, and Zurich. He lived abroad, in Switzerland (Lenzburg and Zurich), in Italy (Milan), and in Belgium (Brussels), and was well acquainted with the modern literatures of Europe, on which he frequently lectured, besides giving readings from his own poems. In 1896-1905 he was his own publisher in Zurich and Leipzig. He settled in Munich in 1908. His poetry is revolutionary and socialistic in its tendency. Among his books are: *Skizzenbuch* (1884); *Strophen* (1887); *Diorama* (1889); a collected edition in 1898; *Gipfel und Gründe* (1904); *Mein Lied* (1906); *Schwingungen* (1907); *Im Weitergehn* (1911).

HENDERSON. A city and the county seat of Henderson Co., Ky., 12 miles below Evansville, Ind., on the Louisville, Henderson, and St. Louis, the Louisville and Nashville, and the Illinois Central railroads, and on the Ohio River (Map: Kentucky, C 4). A magnificent bridge crosses the Ohio at this point. Among the attractions of the place are Atkinson Park, containing 100 acres, and the county fair grounds. The city has fine public-school buildings, a Carnegie library, and a well-equipped sanatorium. Henderson controls an important trade in tobacco, corn, wheat, and fruit, particularly apples; and among its industrial establishments are cotton and woolen mills, grain elevators, tobacco stemmeries, hominy mills, saw and planing mills, a furniture factory, wagon works, extensive coal mines, box factories, etc. First incorporated in 1797, the city is now governed by a mayor and a common council. The water works, gas plant, and electric-light plant are owned and operated by the municipality. Pop., 1900, 10,272; 1910, 11,452; 1914 (U. S. est.), 11,953. In 1905 two towns, Audubon and Edgewood, were annexed.

HENDERSON. A town and the county seat of Vance Co., N. C., 43 miles north by east of Raleigh, on the Seaboard Air Line and the Southern railroad (Map: North Carolina, D 1). It carries on an important trade in tobacco and cotton and has several extensive tobacco warehouses, cotton mills, bagging mills, cottonseed-oil mills, buggy and automobile factories, etc. Settled in 1820, Henderson was first incorporated in 1842. Under a charter last revised in 1912, the government is vested in a mayor, biennially elected, and a municipal council. Pop., 1900, 3746; 1910, 4503.

HENDERSON. A city and the county seat of Chester Co., Tenn., 18 miles southeast of Jackson, on the Mobile and Ohio Railroad (Map: Tennessee, B 3). It is the seat of the National Teachers' Normal and Business College and a county high school. Henderson is the centre of an agricultural region and has some manufactures and considerable cotton trade. Pop., 1910, 1087.

HENDERSON. The county seat of Rusk Co., Tex., 232 miles by rail north by east of Houston, on the Timpson and Henderson and the International and Great Northern railroads (Map: Texas, E 3). It has a normal college. There are cotton gins, a pottery, an oil mill, a saw mill, a handle factory, a machine shop, and a creamery, and a trade in cotton, live stock, etc. Pop., 1914 (local est.), 4500.

HENDERSON, ALEXANDER (c.1583-1646). One of the greatest men in Scottish history and, next to Knox, the most renowned ecclesiastic of Scotland. He was born in the Parish of Grieve, Fifeshire, about 1583, and educated at St. Andrews (M.A., 1603). He was presented to the living of Leuchars (1614) by Archbishop Gladstones, and, turning from Episcopacy to the ardent support of Presbyterianism, became one of the most influential ministers of Scotland. In 1639 he was transferred to Edinburgh. He was mainly responsible for the National Covenant, which was publicly signed in Grey Friars Church, Edinburgh, 1638. During the troubled times of Charles I's reign Henderson's influence was felt in the negotiations for peace between the Scottish ecclesiastics and the court, and when Charles visited Scotland in state (1641) Henderson attended him as chaplain, and later on went to Oxford to mediate between the King

and Parliament. In 1643 Henderson was elected moderator for the third time in the General Assembly at Edinburgh and in that capacity presented a draft of the famous Solemn League and Covenant, an instrument against prelacy which was generally accepted by the Puritans. With Baillie, Rutherford, and others, Henderson represented Scotland in the Westminster Assembly, when the Solemn League, with slight modifications, passed both Houses and became law for the two kingdoms. When in 1646 the King joined the Scottish army and retired with it to Newcastle, he sent for Henderson and discussed the systems of Church government in a number of papers. Henderson died at Edinburgh, Aug. 19, 1646, and his death was the occasion of a national mourning in Scotland. For his life, consult Aiton (Edinburgh, 1836).

HENDERSON, ANDREW (c.1705-75). A Scottish maker and seller of books. He was born in Roxburghshire and was educated at Aberdeen and in Edinburgh, where he afterward was a high-school teacher as well as a tutor in titled families. He was in London when his first book was published, a translation of Voltaire's *Charles XII of Sweden* (1734), but was back in his native land in time to witness the Jacobite uprising and to describe it in *A History of the Rebellion, 1745 and 1746* (1748). He began his bookselling at Long Acre, London, but continued to produce histories such as *Frederick, King of Sweden* (1752) and *William the Conqueror* (1764); memoirs such as *Dr. Archibald Cameron* (1753), *Field-Marshal Leopold, Count Daun* (Fr. trans., 1757), and *Field-Marshal James Keith* (1758); and controversial and miscellaneous writings. His best book is, perhaps, *The Life of William Augustus, Duke of Cumberland* (1766).

HENDERSON, ARCHIBALD (1877-). An American professor of mathematics and writer, largely on the drama. He was born at Salisbury N. C., was educated at the University of North Carolina (A.B., 1898; Ph.D., 1902), and studied also at Chicago, Cambridge, and Berlin universities, and at the Sorbonne (Paris). After 1899 he taught at the University of North Carolina, becoming professor of pure mathematics in 1908. His publications include: *Lines on the Cubic Surface* (1911); *Interpreters of Life and the Modern Spirit* (1911); *Mark Twain* (1911); *George Bernard Shaw: His Life and Works* (1911); *Forerunners of the Republic* (1913); *The Life and Times of Richard Henderson* (1913); *European Dramatists* (1913); *The Changing Drama* (1914).

HENDERSON, CHARLES HANFORD (1861-). An American educator, born in Philadelphia and educated at the University of Pennsylvania (B.S., 1882) and at Zurich (Ph.D., 1892). For two years (1883-85) he was lecturer at Franklin Institute, Philadelphia, and then, after a year of editorial work for the *Scientific American*, was connected with the Philadelphia Manual Training High School as science teacher and principal from 1886 to 1896. From 1898 to 1900 he directed the Pratt Institute High School in Brooklyn, and for two years he was assistant literary editor of the *Philadelphia Press*. His publications include: *The Elements of Physics* (1900); *Education and the Larger Life* (1902); *John Percyfield* (1903); *Children of Good Fortune* (1905); *The Countryman* (1907); *The Lighted Lamp* (1908); *Pay-Day* (1911); *What is it to be Educated?* (1914).

HENDERSON, CHARLES RICHMOND (1848-1915). An American sociologist, born in Covington, Ind. He graduated at the University of Chicago in 1870 and at Union Theological Seminary in 1873. From 1873 to 1883 he was pastor at Terre Haute (Ind.) and from 1883 to 1892 at Detroit. Appointed in 1892 assistant professor of sociology at Chicago University, he was afterward advanced to the full professorship. In 1898-99 he was president of the National Conference of Charities, in 1902 president of the National Prison Association, and in 1910 of the International Prison Congress. In 1907 he served as secretary of the Illinois Commission on Occupational Diseases. His works include *The Development of Doctrine in the Epistles* (1894); *The Social Spirit in America* (1896); *Social Settlements* (1897); *Social Elements* (1898); *An Introduction to the Study of the Dependent, Defective, and Delinquent Classes* (1898; 2d ed., enlarged, 1901); *Modern Prison Systems* (57th Congress, 2d Session, House Document No. 452, 1903); *Modern Methods of Charity* (1904); *Industrial Insurance in the United States* (1907); *Social Duties from a Christian Point of View* (1909); *Education in Relation to Sex* (1909); *Social Programmes of the West* (1913).

HENDERSON, SIR DAVID (1862-). A British military aviator, born in Glasgow, Scotland. He entered the army in 1883, became captain in 1890, served in 1898 in the Sudan, where he was mentioned in the dispatches and was brevetted major; and he participated in the South African War, during which he was wounded, was mentioned in dispatches twice, and was brevetted lieutenant colonel. Subsequently he was promoted to the rank of brigadier general, was made director of military training in 1912, and in 1913 was placed in charge of the organization of the Royal Flying Corps. When the War in Europe (q.v.) broke out in 1914, he went to the front as chief of this corps. For efficient work in locating the German batteries and movements of troops and in destroying the air machines of the enemy, Henderson was mentioned twice in the dispatches of Field Marshal Sir John French, was officially praised by General Joffre, and was promoted major general in November. In June of the same year he had been made K.C.B. He published *The Art of Reconnaissance* (1907).

HENDERSON, DAVID BREMNER (1840-1906). An American statesman, born at Old Deer, Aberdeenshire, Scotland. He went to Illinois in 1846, to Iowa in 1849, graduated at Upper Iowa University (Fayette, Iowa), studied law in an office at Dubuque, and was admitted to the bar in 1865. In 1861 he enlisted as a private in the Twelfth Regiment Iowa Volunteer Infantry, was elected and commissioned first lieutenant of Company C, and served until discharged, Feb. 26, 1863, owing to the loss of a leg at the battle of Corinth. From May, 1863, to June, 1864, he was commissioner of the board of enrollment of the Third Iowa District, and then reentered the army as colonel of the Forty-sixth Iowa Volunteer Infantry, in which rank he served to the close of the war. From 1865 until his resignation in 1869 he was collector of internal revenue for the Third Iowa District, in 1869 began to practice law as member of a Dubuque firm, and in 1869-71 was Assistant United States District Attorney for the Northern Division of the District of Iowa. He was elected to the

Federal House of Representatives in 1882, as a Republican from the Third Iowa District, was chairman of the Committee on Judiciary, and a member of the Committee on Rules in the Fifty-fourth and Fifty-fifth Congresses, and in 1899, at the organization of the Fifty-sixth Congress, was elected to succeed T. B. Reed, resigned, as Speaker of the House. He was also chairman of the Iowa delegation at three national Republican conventions. In Congress he acquired reputation for his skill in debate and the wise conduct of his important legislative office.

HENDERSON, EBENEZER (1784-1858). A Scottish missionary and linguist. He was born of poor and humble parents in Fifehire, Nov. 17, 1784. He worked as a clockmaker and shoemaker, but in 1803 entered Robert Haldane's seminary in Edinburgh and studied theology. He planned in 1805 to accompany the Rev. John Paterson to India; but as they could not sail from England, they went to Denmark, where he located at Elsinore and devoted himself to the distribution of Bibles in the Scandinavian countries. In the course of his labors he visited Sweden and Lapland, Iceland, Denmark, and Germany. In 1818 he accompanied Dr. Paterson through Russia as far as Tiflis, and until 1825, when the Russo-Greek church induced the Czar to interdict the Bible Society, he resided at St. Petersburg. Returning home, he was appointed tutor of the Mission College, Gosport, and from 1830 till 1850 was professor of Oriental languages in Highbury Congregational College. He died at Mortlake, May 16, 1858. His linguistic attainments were very great; his knowledge included, besides the classical and European languages, Hebrew, Syriac, Ethiopian, Russian, Arabic, Tatar, Persian, Turkish, Armenian, Manchu, Mongolian, and Coptic. The first Bible society in Denmark was organized by him (1814); he was associated with the London Religious Tract Society and the Society for the Propagation of the Gospel among the Jews. He published an account of his travels in Iceland (1818), Russia (1826), *The Voudois: A Tour to the Valleys of Piedmont* (1845), several volumes of Bible annotations; enlarged Charles Buck's *Theological Dictionary* (1833); and edited numerous volumes of other writers. His *Memoirs* were edited by his daughter (London, 1859).

HENDERSON, GEORGE FRANCIS ROBERT (1854-1903). A British soldier and military historian, born at St. Helier, Jersey, and educated at Leeds Grammar School and at St. John's College, Oxford. Commissioned a second lieutenant in 1878, he served with Graham's brigade in Egypt. His studies while at various stations resulted in *The Campaign of Fredericksburg* (1889; 3d ed., 1891); *The Battle of Spicheren* (1891); *Stonewall Jackson and the American Civil War* (2 vols., 1898; 4th ed., 1911). In 1890 he became a military instructor on tactics and administration at Sandhurst, from 1892 to 1899 was professor of military art and history at the Staff College, in 1900 was director of military intelligence under Lord Roberts in South Africa, and then, returning because of ill health, he revised the infantry drill book and undertook to write a history of the South African War. He came to hold first rank as a military historian. Many of his lectures and papers were collected and published by Captain Malcolm in 1905 under the title *The Science of War*.

HENDERSON, JAMES PINCKNEY (1808-58). An American soldier and political leader. He was born in Lincoln Co., N. C., practiced law in Mississippi, went to Texas in 1836, and served as brigadier general during the revolution of that year. He was Secretary of State of the Texan Republic in 1837-39, was a minister to England and France to secure the recognition of Texan independence, and went to Washington in 1844 to secure annexation. He was a member of the Texas Constitutional Convention in 1845 and in the following year was elected first Governor of the State after annexation. He served in the Mexican War and was presented with a sword by Congress. In 1857 he was appointed Senator from Texas as a State-Rights Democrat.

HENDERSON, JOHN (1747-85). An English actor of Scottish descent, native of Cheap-side, London. In Bath (1772) he made his debut as Hamlet, was fairly successful in other Shakespearean rôles, and came to be known as "Bath Roscius." In 1777 he was acting at the Haymarket, London, and for the two following years was with Sheridan at Drury Lane, making himself famous as Shylock and Falstaff, besides creating characters in plays of Shirley, Cumberland, Jephson, and Mackenzie. He was engaged at Covent Garden from 1779 until his death and was ever remembered gratefully by Mrs. Siddons, whom he had encouraged, and by many others of the profession, though Garrick was jealous of him, and he had earned the ill will of Colman, another actor manager, by his powers of mimicry. The deficiencies of Henderson's voice and person were overbalanced by the superior qualities of his mind, and he achieved special renown as a reader and a reciter of dramatic monologues. Gainsborough, his intimate friend, painted his picture, and there are portraits of him also by Stuart and Romney. He was buried in Westminster Abbey. With Sheridan, he wrote *Practical Method of Reading and Writing English Poetry*.

HENDERSON, JOHN BROOKS (1826-1913). An American lawyer and public official, born in Pittsylvania Co., Va. He received an academic education, studied law and began its practice in 1848, and was a member of the Missouri Legislature in 1848 and in 1856-57. He participated in the Missouri Convention of 1861-63 to decide the question of secession, served as United States Senator from 1862 to 1869, was special commissioner in 1867 to make peace with the Indian tribes of the West, was Republican candidate for Governor of Missouri in 1872, and as special United States Attorney he aided in the prosecution of the Whisky Ring of St. Louis in 1875. In 1884 he was president of the Republican National Convention at Chicago. He is remembered also as the author of the Thirteenth Amendment to the Constitution (prohibiting slavery).

HENDERSON, PETER (1822-90). A Scottish-American horticulturist, born at Pathhead, Scotland. He came to America in 1843 and engaged in horticultural pursuits. In 1862 he opened a seed store in New York City and in 1871 undertook the seed business on a large scale under the firm name of Peter Henderson & Co. He was not only very successful as a seed merchant, but also did much to develop improved varieties of horticultural plants. He has been deservedly called "the father of horticulture and ornamental gardening" in the

United States. He wrote much for horticultural journals and was the author of the epoch-making book entitled *Practical Floriculture* (1867), which has passed through many editions. Some of his other works are: *Gardening for Profit* (1866); *Gardening for Pleasure* (1875); *Garden and Farm Topics* (1884).

HENDERSON, RICHARD (1734-85). An American pioneer, born in Hanover Co., Va. He removed to Granville Co., N. C., in 1762, studied law, was admitted to the bar, and in 1769 was appointed associate justice of the Superior Court. After the Declaration of Independence and the organization of the State government in North Carolina, he was reelected judge, but was prevented from accepting that position by his participation in a scheme organized under the name of the Transylvania Land Company, by which in 1775 the Cherokee Indians were induced to transfer to the company all the land lying between the Cumberland River, the Cumberland Mountains, and the Kentucky River, and situated south of the Ohio. This territory, half as large as the present State of Kentucky, was organized by Henderson and his associates into a political community, with president, legislature, and judges; but the State of Virginia annulled the purchase from the Indians, whose chiefs had signed the Treaty of Watauga for the purposes of the transfer. Nevertheless the enterprise and success of Henderson and his friends in colonization and settlement were rewarded by the Virginia Legislature with the grant of a tract of land 12 miles square on the Ohio River, below the mouth of Greene River. In 1779 Judge Henderson was appointed one of six commissioners to run the line between Virginia and North Carolina into Powell's valley. After a short residence in Nashville, Tenn., where he practiced law, he returned to North Carolina and engaged in farming on a large scale.

HENDERSON, THOMAS (1798-1844). A Scottish astronomer, born at Dundee and educated at the academy of that city. He had to go to work at 15, but all his spare time was spent on astronomy. From 1819 to 1831 he was secretary to the Earl of Lauderdale and to Lord Jeffrey and during this period became known to astronomers in Edinburgh and to the Royal Society of London. In 1831 he was made Astronomer Royal at the Cape of Good Hope, succeeding Fellows, but resigned two years later; was appointed Astronomer Royal for Scotland, professor of practical astronomy at Edinburgh, and director of the Calton Hill Observatory. Henderson wrote contributions, on the orbits of several comets, to the *Astronomische Nachrichten* and published five volumes of his observations (1838-43; continued by Smyth, 1843-52). He is best known for his new method of calculating occultations, his determination of the parallax of α Centauri, and his remarkable ability in astronomical computation.

HENDERSON, WILLIAM JAMES (1855-). An American musical critic and scholar, born at Newark, N. J. He graduated from Princeton in 1876 and immediately began work as a journalist, serving in 1883 as a reporter, four years later as the musical critic of the *New York Times*, and in 1902 of the *New York Sun*. Later he received the appointment of lecturer on musical history in the New York College of Music. In 1914 he was elected a member of the National Institute of Arts and

Letters. Besides writing the librettos to a number of light operas and also to Damrosch's *Cyrano de Bergerac*, he published: *What is Good Music?* (1898); *How Music Developed* (1899); *The Orchestra and Orchestral Music* (1902); *Richard Wagner* (1901); *Modern Musical Draft* (1904); *The Art of the Singer* (1906); *Some Forerunners of Italian Opera* (1911). Besides these, he published *Pipes and Timbrels*, poems (1905), stories, and a novel, *The Soul of a Tenor* (1912).

HENDERSON, YANDELL (1873-). An American physiologist, born at Louisville, Ky. He was educated at Yale University (B.A., 1895; Ph.D., 1898) and studied at the universities of Marburg (1899) and Munich (1900). At the Yale Medical School he became instructor in physiology in 1900, assistant professor in 1903, and professor in 1911. He served as ensign in the United States navy during the Spanish-American War and became a consulting surgeon for the United States Bureau of Mines. He was a member of the Connecticut House of Delegates, served as vice chairman of the Connecticut delegation to the first National Convention of the Progressive party, and was Progressive candidate for Congress in 1912. He is coauthor of *Report of Pike's Peak Expedition* (1913) and is author of *Shock: or, The Pathological Physiology of Some Modes of Death* (1914).

HENDERSONVILLE. A city and the county seat of Henderson Co., N. C., 22 miles south by east of Asheville, on the Southern Railway (Map: North Carolina, C 4). It has a cannery, hosiery mills, creamery, lumber yard, etc., and considerable trade in potatoes, cabbages, and apples. The city is a popular summer resort and contains a Carnegie library, hospital, and the Blue Ridge School for Boys. The water works are owned by the city. Hendersonville has adopted the commission form of government. Pop., 1900, 1917; 1910, 2818.

HENDON. A town in Middlesex, England, situated on the picturesque coach route from London to St. Alban's and on the Midland Railroad, 6 miles northwest of St. Pancras Station, London (Map: London, C 6). Pop., 1901, 22,450; 1911, 33,806.

HENDRICK, DAVID. See CHASSÉ, BARON.

HENDRICKS, THOMAS ANDREWS (1819-85). An American politician. He was born near Zanesville, Ohio, was early taken by his parents to Indiana, graduated at South Hanover College in 1841, and two years later was admitted to the bar. He practiced his profession with success in Indiana, was a Democratic member of the Pennsylvania Legislature and the State Constitutional Convention of 1851, and was a member of Congress from 1851 to 1855. Appointed Commissioner of the General Land Office by President Pierce, he served until 1859. He was United States Senator from 1863 to 1869 and in 1868 was a candidate for the Democratic nomination for President. In the next presidential election, the Democratic candidate, Horace Greeley, having died before the casting of the electoral votes, they were given to Hendricks. He was Governor of Indiana from 1873 to 1877. He ran for Vice President of the United States on the ticket with Samuel J. Tilden in 1876 and was elected Vice President in 1884 on the ticket with Grover Cleveland, but died Nov. 25, 1885.

HENDRICKSON, GEORGE LINCOLN (1865-). An American Latinist, born at Win-

chester, Ill. He was educated at Beloit College, the Johns Hopkins University, and the universities of Bonn and Berlin. He was professor of Latin at the University of Wisconsin from 1891 to 1896 and at the University of Chicago from 1897 to 1907. In 1907 he was called to Yale University. His writings include frequent contributions to the *American Journal of Philology* and to *Classical Philology* on subjects relating to the history of Latin literature. Especially worthy of mention are "The Dramatic Satira and the Old Comedy at Rome" and "A Pre-Varronian Chapter of Roman Literary History," in *American Journal of Philology*, xv, xix (1894, 1898); "The Origin and Meaning of the Ancient Characters of Style," in *American Journal of Philology*, xxvi (1905); "Satira—The Genesis of a Literary Form," in *Classical Philology*, vi (1911).

HENDRIX, EUGENE RUSSELL (1847–). An American Methodist Episcopal bishop, born at Fayette, Mo. Graduating from Wesleyan University in 1867 and from Union Theological Seminary in 1869, in 1870 he entered the ministry of the Methodist Episcopal Church South. From 1878 to 1886 he was president of Central College, Fayette, Mo.; in 1886 he was elected Bishop. He was president of the Federal Council of the Churches of Christ in America in 1908–12, and in 1900 was fraternal delegate of his church to the Wesleyan conference of England. He is author of: *Around the World* (1878)—he made official visits to various countries and founded his church's mission in Korea; *Skilled Labor for the Master* (1900); *The Religion of the Incarnation* (1903); *The Personality of the Holy Spirit* (1904); *Christ's Table Talk* (1908).

HENDRIX COLLEGE. An institution of higher learning under the auspices of the Methodist Episcopal Church South, founded at Conway, Ark., in 1884. It is a college of liberal arts only and has no professional departments. It confers only two degrees, B.A. and B.S. The number of students in 1914 was 264, and the instructors numbered 12. The productive endowment in that year was \$300,000, and the value of the college grounds and buildings was \$100,000. The college has an annual income of about \$30,000. In 1913–14 a new president's house was erected by the alumni at a cost of \$16,000. The general education board in 1914 awarded \$100,000 on condition that the college raise \$300,000. Of this sum \$250,000 is to be added to the endowment and \$150,000 is to be expended on new buildings. The library contains 14,000 volumes. The president in 1914 was Rev. J. H. Reynolds, LL.D.

HENEQUEN, hēn'e-kēn; *Mex. Sp.* hēn'ē-kēn'. The Mexican name of the plant *Agave fourcroydes* and of the fibre produced from its leaves. The plant closely resembles the maguey plant (*A. cantala*) and the true sisal plant (*A. sisalana*) (see **HEMP, SISAL**), but its fibre, largely used in making binder twine, is not quite so valuable as the fibre of these two species. Henequen is a native of Mexico, where it is largely cultivated, particularly in Yucatan. The plant lives from 15 to 25 years. The stems when mature range from about 2 to 5 feet in height. The fibre, from 3 to 5 feet long, is commercially known as sisal, or Mexican sisal, although the term "sisal" is considered more appropriately applied to the fibre of *A. sisalana*. Mexico exports about 120,000 tons of henequen fibre annually.

HENEY, FRANCIS JOSEPH (1859–). An American lawyer, noted as a prosecutor of grafters. He was born at Lima, N. Y., and studied at the University of California (1879–80) and at the Hastings Law School (1883–84). After an adventurous early career in the cattle business in Arizona (1885–89) and as an Indian trader at Fort Apache, Ariz. (1886–88), he practiced law at Tucson, Ariz., until 1895. He participated in the Mexican land-grant cases, three of which he argued before the United States Supreme Court. After serving as Attorney-General of Arizona in 1893–94, he moved to San Francisco in 1895 and took up private practice. Having undertaken, at the request of Attorney-General Knox, the prosecution of land-fraud cases at Portland, Oreg., he obtained the indictment and removal from office of United States Attorney Hall, the indictment and conviction of Senator Mitchell, and the punishment of other politicians and officeholders. During a part of this period he was United States District Attorney for Oregon. In 1906 his investigation of municipal corruption in San Francisco attracted nation-wide attention. The disclosures made at this time resulted in the conviction, among other officeholders, of Mayor Eugene Smitz and of the notorious political "boss," Abe Ruef. Consult Lincoln Steffens, "The Making of a Fighter," in the *American Magazine* (New York, August, 1907).

HENGEST, hēng'gēst, or **HENGIST**, AND **HORSA**. The legendary leaders of the first Germanic invaders of Britain. About 449 A.D. a band of Jutes landed at Ebbsfleet on the island of Thanet. They came from the peninsula now called Jutland and, according to tradition, were in three vessels. Tradition has assigned to their leaders the names of Hengest and Horsa—one meaning 'the horse' and the other 'the mare.' It is now generally held that these names are mythical. This point of view is confirmed by the fact that Hengest is the name assigned to the hero of many different traditions. The cromlech called Wayland Smithy has sometimes been designated as a monument to Hengest and Horsa. Consult Elton, *Origins of English History* (London, 1882). See **ANGLO-SAXONS**.

HENGSTENBERG, hēng'sten-bērk, **ERNST WILHELM** (1802–69). The leader of the Conservative school of theologians in Germany during the first half of the nineteenth century. He was born in Westphalia, Oct. 20, 1802, the son of a clergyman. He studied at Bonn and became tutor in Basel (1822–24). Going to Berlin in 1824 as privatdocent, he put himself at the head of a rising orthodox school and with most conscientious devotedness made the scientific defense of their principles the aim of his labors in the university and through the press. He was made professor extraordinary in 1826 and full professor in 1828. As editor of the *Evangelische Kirchenzeitung*, begun in 1827, he combated rationalism even in its mildest forms, seeking to restore the orthodoxy and Church discipline of the sixteenth and seventeenth centuries. With the same view were written all his principal works: *Christologie des alten Testaments* (1829–35; 2d ed., 1854–57); *Beiträge zur Einleitung ins alte Testament* (1831–39); *Kommentar über die Psalmen* (1842–45; 2d ed., 1850); *Das Hohelied Salomons ausgelegt* (1853); and others devoted to the defense of the old interpretation and criticism of the Scriptures against the results of modern biblical science. Hengstenberg's

influence in ecclesiastical matters also was employed in carrying out the high Lutheran dogmas of the Church, of Church offices, and of the sacraments, by persecution of sectaries, by opposition to the union of Lutherans and Reformed, and by attempts to depose from their chairs Gesenius, Wegscheider, De Wette, and other rationalistic teachers in the universities. He died in Berlin, May 28, 1869. Among his later works were: *Die Weissagungen des Propheten Ezekeil* (1867-68); *Geschichte des Reiches Gottes unter dem alten Bunde* (1869-71); *Das Buch Hiob erläutert* (1870-75). Most of his exegetical and critical works have been translated. For his life, consult Bachmann and Schmalenbach (Gütersloh, 1876-92). Consult also Lichtenberger, *History of German Theology in the Nineteenth Century* (New York, 1889).

HEN HAWK, **HEN HARRIER**, or **CHICKEN HAWK**. A hawk which attacks poultry. This definition includes an extensive list and variety of birds of prey, if the entire English-speaking world is considered, and the accusation is not always a fair one, as the offense is occasional rather than habitual with many of the birds against which it is charged. The term "hen harrier" is British and belongs to the subfamily *Circinæ*, represented in the United States by the innocent marsh hawk (q.v.). Many of the eagles and larger falcons, as well as some of the smaller ones, do now and then swoop upon domestic fowls; yet these robberies constitute only a small proportion of their food, which mainly consists of small mammals, frogs, grasshoppers, and other insects. In certain places the smaller falcons may become a serious local nuisance to the poultry keeper, especially in winter; but in general the harm they do is far more than compensated for by their service to agriculturists in destroying injurious rodents and insects. The miscellaneous destruction of hawks and owls is therefore unwise. The species commonly called hen hawks includes two birds, the red-tailed and the red-shouldered hawk. See **BUZZARD**.

Red-Tailed Hawk. The redtail (*Buteo borealis*) is one of the largest, most numerous, and most widely distributed of North American buzzard hawks. It is from 19 to 25 inches long, and its spread of wings is from 49 to 58 inches. In maturity the upper surface is blackish brown, variegated with whitish and dull rust color, the last tint growing brighter on the upper surface of the tail, which has a blackish crossband near the end. The undersurface of the body is buffy white, the belly marked with dark streaks. Young specimens show a dark zone across the lower part of the breast, and from 6 to 10 regular dark bands across the gray tail. Western specimens vary a good deal and were described as separate species by early writers. The majority of them leave the Northern States in winter and migrate in large flocks. They build their nests in tall trees. Their food includes all the mammals from the size of a squirrel downward, and all sorts of birds from grouse and rails to sparrows; but this larger game is far outnumbered by the smaller gophers, mice, frogs, insects, and carrion upon which they principally subsist. Fisher declares that it has been demonstrated by careful examination of stomachs that poultry and game birds do not constitute more than 10 per cent of the food of this bird.

Red-Shouldered Hawk. This species (*Buteo lineatus*) is rather less in size than the redtail and generally more reddish in plumage, especially

bright on the shoulders, while the lower parts (whitish in the young) are everywhere rusty in color, transversely barred with a darker tint. The tail is black, covered by about six bands of white. It is a rather heavy, sluggish bird and lives throughout the year south of the Great Lakes, frequenting lowlands and marshes, except in the spring, when it retires to the woods for breeding purposes. The great tree-built nest is often begun before the end of February. This hawk's diet is exceedingly varied and includes a larger proportion of frogs and snakes than the redtail's. It preys principally on mice, however, and almost never attacks poultry, so that its reputation as a hen hawk is undeserved. On the contrary, its work is of the highest benefit to farmers, who should carefully preserve it. A similar species, Swainson's hawk, of the Western interior, is equally beneficial and worthy of protection because of the great numbers of gophers, locusts, and the like it kills at all seasons.

Chicken Hawks. Under this head may be mentioned a few of the smaller destructive falcons. The goshawk and gyrfalcon (q.v.) are so rare that the harm resulting from them is small. The sharp-shinned hawk (*Accipiter velox*) is a true falcon and inhabits all of North America, migrating annually from the northern districts to the warmer parts. It is about 1 foot long. Its pointed wings stretch about 2 feet, and they enable it to fly with extreme swiftness and power. In color it is uniformly grayish above, darker on the crown, and the tail is crossed by several blackish bands; below, the surface is white, with breast and sides barred dusky or rufous. It takes its name from the sharp front of the tarsi. Its courage and boldness are admirable, but they are unfortunately directed mainly against birds, which constitute almost all of its food. Where it settles on a farm it lives upon young chickens, since these are more easily caught than wild birds; and it stays in the neighborhood until it is killed or the supply of poultry is exhausted. It is to be noted in its favor, however, that it preys persistently upon the English sparrows. Cooper's hawk (*Accipiter cooperi*) is nearly twice as large as the sharpshin, but closely resembles it in color. It is not found much north of the St. Lawrence and Saskatchewan valleys, and in winter retreats south of the middle part of the United States. Like the sharpshin, it feeds mainly upon birds and is destructive to English sparrows and poultry, with a special fondness for domestic pigeons. These two smaller falcons and certain owls are responsible for most of the evil reputation attaching to the hawk tribe in the minds of indiscriminating poultry keepers.

Consult Fisher, *Hawks and Owls of the United States* (Washington, 1893) and *Hawks and Owls from the Standpoint of a Farmer* (ib., 1907).

HENKE, hēnk'e, HEINRICH PHILIPP KONRAD (1752-1809). A German Protestant ecclesiastical historian, born at Hehlen. He was educated at Brunswick and at Helmstedt, where in 1778 he became professor of philosophy and theology. He is best known as author of a valuable *Allgemeine Geschichte der christlichen Kirche* (1795-1806). Consult the biography by Wolff and Bollmann (Helmstedt, 1816).—His youngest son, ERNEST LUDWIG THEODOR HENKE (1804-72), born at Helmstedt, was also a Church historian. In 1833 he became professor at Jena, and in 1843 at Marburg, where six years afterward he was appointed supervisor of the Theological

Seminary. His works include: *Georg Calistus und seine Zeit* (1853-60); *Papst Pius VII.* (1860); *Konrad von Marburg* (1861). For his biography, consult Mangold (Marburg, 1879).

HENLE, hën'le, FRIEDRICH GUSTAV JAKOB (1809-85). A German pathologist and anatomist, born at Fürth. He studied at Bonn and Heidelberg (1827-32) and then became assistant to Rudolphi in the anatomical museum at Berlin and in 1834 demonstrator of anatomy under Johann Müller. Three years later he became privatdocent in Berlin and made a specialty of microscopic anatomy and pathology. From 1840 to 1844 he was professor of anatomy and physiology at Zurich and in the latter year went to Heidelberg as professor of anatomy, pathology, and physiology. At this time he wrote *Handbuch der rationellen Pathologie* (3d ed., 1855), which put him in the first rank of the members of the rational-physiological school. His most important work was *Handbuch der systematischen Anatomie des Menschen* (3d ed., 1876-79), in connection with which he issued *Anatomischer Handatlas zum Gebrauch im Seieraal* (3d ed., 1895-96). Henle's other works include: *Pathologische Untersuchungen* (1840); *Handbuch der allgemeinen Anatomie* (1841); *Grundriss der Anatomie des Menschen, mit Atlas* (4th ed., 1901). He also wrote yearly reviews on pathology and anatomy for Müller's *Archiv* (1838-42) and on anatomy in general in Cannstatt's *Jahresbericht* (1844-55). In 1841 he founded with Pfeufer the *Zeitschrift für rationelle Medizin*. For his life, consult Merkel (Brunswick, 1891).

HENLEIN, hën'lin, PETER. See HELE.

HENLEY, JOHN (1692-1756), commonly known as ORATOR HENLEY. An eccentric English clergyman, son of Rev. Simon Henley. He was born at Melton Mowbray, Leicestershire, and educated at St. John's College, Cambridge. While an undergraduate, he sent a witty letter to the *Spectator* (1712). After leaving the university he became headmaster of the grammar school of his native town. He was also ordained and held for some time a curacy there. In 1714 he published a rhetorical poem entitled *Esther, Queen of Persia*. He also compiled at this period a grammar of seven languages called *The Complete Linguist* (1719-21). Removing to London, he was appointed reader at the church of St. Joseph the Martyr. He found it agreeable to retire, in 1724, to the rectory of Chelmondiston in Suffolk. Again, his talents not being appreciated, he left the Church and returned to London, where he opened, in 1726, his famous oratory in Newport Market. His pompous elocution and his strange service drew for a time large congregations. He struck medals of admission to his hall, bearing the device of a star rising to the meridian with the motto *Ad summa*, and below, *Inveniam viam aut faciam*. His pulpit was covered with velvet and adorned with gold and over his altar was raised the inscription "The Primitive Eucharist." In 1730 he became a pensioner of Walpole, editing for him the rather disreputable periodical called the *Hyp Doctor*. He was ridiculed by Pope, and he furnished the subject for two plates by Hogarth. Fifty manuscript volumes of his lectures were deposited in the British Museum. Consult I. Disraeli, *Calamities of Authors* (2 vols., London, 1812), in which Henley is considered.

HENLEY, ROBERT, EARL OF NORTHINGTON. See NORTHINGTON.

HENLEY, WALTER DE (flourished 1250). An English friar and author of the thirteenth century. He wrote in French a work called *Hosebondrie* (date unknown), which for two centuries was the best treatise on agriculture. The book was several times translated into Latin and English and once into Welsh. A unique copy of an English version is in the possession of the Cambridge University Library.

HENLEY, WILLIAM ERNEST (1849-1903). An English poet, critic, and dramatist, born at Gloucester. He was educated at the Crypt Grammar School at Gloucester. While ill at a hospital in Edinburgh in 1874—which experience he afterward embodied in *Hospital Rhymes*—he met Robert Louis Stevenson; and the two men, in many ways alike, were intimate friends for 13 years. Together they wrote the plays, *Deacon Brodie* (1879), *Bow Austin* (an admirable comedy), *Admiral Guinca*, and *Robert Macane*; and Stevenson contributed to several of Henley's publications. Henley edited *London* (1877-78); the *Magazine of Art* (1882-86); the *Scots Observer*, which was transferred to London as the *National Observer* (1888-93); and the *New Review* (1893-98). There has been adverse criticism of Henley for his arraignment of Balfour's *Life of Stevenson*, which he claimed did not give a true idea of his friend's character. He has also been criticized for his point of view in the essay on Burns, *The Centenary Burns* (1897), with T. F. Henderson (terminal essay by W. E. H., reprinted as *The Life, Genius, and Achievement of Robert Burns* in 1898). He was strong in his likes and dislikes and arrogant, even aggressive, in his statement of them. But the brilliant style, the acute insight, the technique, the pungent felicitous wit, make the work a *tour de force* of criticism. His *Views and Reviews* (1890), concerned with literature, and *Views and Reviews* (1902), concerned with art, are collected from previous publications. They show primarily his own personality, but they are never commonplace and never dull. His learning is solid, whether he touches on literature or art; and he is always suggestive. As a poet, Henley belongs to the "fleshly school." In subject and treatment he is essentially modern and original. Perhaps his most characteristic work is "London Voluntaries," in *Song of the Sword* (1898). His poetry, like his prose, is egotistical; but a certain lyrical passion and intensity entitle a group of his poems to good hope for a long life. Sometimes his imagery is grotesque, and his humor of the grimmest, but he had the gift of original and powerful expression. His *Collected Works* (New York) appeared in seven volumes in 1908. He edited *Lyra Heroica* (1891); *A London Garland* (1895); *English Lyrics* (1897); *The Works of Lord Byron* (1897); *The Poetry of Wilfrid Blunt* (1898), with George Wyndham; and wrote *London Types* (1898), with drawings by W. Nicholson; *A Book of Verses* (1888); *Poems* (1898); *For England's Sake* (1900); *Ianethorn and Lavender, and Other Verses* (1901); *Shakespeare, the Edinburgh Folio* (1901); *A Song of Speed* (1903). The *English Illustrated Magazine*, vol. xxix, contains a useful bibliography. Consult also L. C. Cornford, *W. E. Henley* (New York, 1913).

HENLEY-ON-THAMES, tēmz. A town in Oxfordshire, England, on the left bank of the Thames, 35 miles west of London (Map: England, E 5). It has a fine situation at the foot

of the Chiltern Hills and is a favorite boating and angling resort, famous for the annual regatta held here since 1839, in which crews from the universities participate. American colleges are frequently represented. An elegant stone bridge which spans the Thames, the old parish church, grammar school, town hall, library and reading rooms, are prominent features. Henley dates from the Roman occupation and received a charter of incorporation from Elizabeth. Pop., 1901, 5984; 1911, 6456. Consult Burn, *History of Henley-on-Thames* (London, 1861).

HENLEY REGATTA. The most famous open rowing contest in the world, held annually at Henley-on-Thames during the month of July. It lasts for three days, during which the gathering of a brilliant assemblage makes the river and its banks a scene of the utmost picturesqueness. This regatta was founded in 1839, when the first eight-oar race was rowed for the Grand Challenge Cup. The course is 1 mile 550 yards in length; owing to the narrowness of the course (which is only 110 feet wide), all races are rowed in heats of only two boats at a time. Four events are open to all amateurs, the eight-oar race for the Grand Challenge Cup, the four-oar for the Stewards' Cup, the pair-oar for the Silver Goblets, and the single scull for the Diamond Sculls. Entries are restricted to the United Kingdom for the Ladies' Challenge Plate for eight oars and the Visitors' Challenge Cup for four oars and also the Wyfold Challenge Cup for four oars and the Thames Challenge Cup for eight oars. Towards the close of the nineteenth century the purely amateur character of the regatta was threatened by the increasing participation of crews trained by professional coaches and competing with all the advantages of professionalism. This gave rise to considerable agitation and a strong demand on the part of some of the English rowing clubs for the exclusion of foreign crews. The culmination of the agitation occurred in 1902, when a regulation was enacted which prohibited all competing crews and individuals from the enjoyment of a professional coach for a period of 30 days immediately preceding the race or regatta. American contestants for the Grand Challenge Cup prior to 1914 have been crews from Cornell University in 1895, Yale in 1896, the University of Pennsylvania in 1901, and a crew from the Vesper Boat Club of Philadelphia in 1905, each of which was beaten. In 1914 there were two entries from America—the Harvard Second Varsity and a crew from the Union Boat Club (Boston) composed of Harvard graduates. Having defeated their opponents in preliminary heats, these crews rowed in the final heat against each other, the Harvard Second Varsity winning—this being America's first victory and England's fifth defeat. Consult: Woodgate, *Boating* (Boston, 1888); H. T. Steward, *Records of the Henley Regatta . . . 1839 to 1902* (London, 1903); T. A. Cook, *Racing at Henley* (ib., 1911).

HENLOPEN, CAPE. See CAPE HENLOPEN.

HENNA. See FNNA.

HEN'NA, or HIN'NA (Ar. *hinnā'*, from *ha-na'a*, to be green). A name given to *Lawsonia alba*, a shrub of the family Lythraceae. The species was formerly divided into *Lawsonia inermis* and *Lawsonia spinosa*; but both are now grouped under *Lawsonia alba*, the only species. They differed in little but that the one is unarmed and the other thorny, the latter being also the larger plant. Henna grows in moist situations through-

out the north of Africa, Arabia, Persia, and the East Indies. It is cultivated in many places for the sake of its flowers, which are much prized for their fragrance, but still more for the sake of the leaves, which abound in coloring matter, and which, being dried, powdered, and made into a paste with hot water and catechu, are very generally employed by women throughout the East to stain the nails and tips of the fingers of an orange color: also by men to dye their beards, the orange color being converted into a deep black by indigo; and for dyeing the manes and hoofs of horses, and to dye skins and leather reddish yellow. Powdered henna leaves form a large article of export from Egypt to Persia and to various parts of Turkey, from which they find their way to more northern countries to be employed in dyeing furs and some kinds of leather. The use of henna for staining the nails appears to have prevailed from very ancient times. See ALKANET.

HENNE-AM-RHYN, hën'ne-äm-rën, OTTO (1828-1914). A Swiss-German historian of civilization. He was born at Saint-Gall in Switzerland and was the son of Anton Henne, a Swiss historian and poet. He studied at Bern and, after holding several positions as teacher and archivist in Switzerland, went in 1872 to Leipzig, where he was editor of the *Freimaurerzeitung*. From 1882 to 1885 he lectured in the University of Zurich, and from 1885 to 1912 he was state archivist at Saint-Gall. In later years he lived in Weiz, Styria. He wrote: *Geschichte des Schweizervolks und seiner Kultur* (last ed., 1879); *Kulturgeschichte der neuern Zeit* (1870-72); *Die deutsche Volksage* (1879); *Allgemeine Kulturgeschichte von der Urzeit bis zur Gegenwart* (1877-97); *Kulturgeschichte des Judentums* (2d ed., under the title *Kulturgeschichte des jüdischen Volks*, 1892); *Das Jenseits* (1881); *Die Kreuzzuge und die Kultur ihrer Zeit* (1883-84); *Kulturgeschichte des deutschen Volks* (last ed., 1898); *Die Kultur der Vergangenheit, Gegenwart und Zukunft* (last ed., 1892); *Die nationale Einigung der Deutschen* (1891); *Das Christentum und der Fortschritt* (1892); *Die Frau in der Kulturgeschichte* (1892); *Die Gebrechen und Sünden der Sittenpolizei* (last ed., 1897); *Geschichte des Rittertums* (1893); *Die Freimaurer* (1894); *Die Jesuiten* (3d ed., 1894); *Aria, das Reich des ewigen Friedens im 20. Jahrhundert: Ein Zukunftsbild* (1895); *Handbuch der Kulturgeschichte* (1900-01). His autobiography appeared in *Deutsche Denker*, vol. viii (Danzig, 1890).

HENNEBERG, hën'ne-bërk, JOHAN WILHELM JULIUS (1825-90). A German agricultural chemist, born at Wasserleben. He was educated at Brunswick, Jena, Giessen, the agricultural college at Badersleben, and in England. In 1853 he founded at Celle the *Journal für Landwirtschaft*; four years later he was appointed director of the new experiment station near Göttingen and in 1865 professor in the university. He was the founder of the present theory of the nutritive value of feeding stuffs, based on their chemical composition and digestibility, as opposed to the former "hay values" of Thaeer; he developed a method for the analysis of feeds; and he conducted epoch-making investigations upon the function and the requirements of various food nutrients in the animal body. For the latter, he developed and adapted for use with large animals the respiration apparatus of Pettenkofer, which for many years remained the

only apparatus of its kind for agricultural investigation. His writings, including more than 170 numbers, were published mainly in current periodicals; but he wrote also, with Stohmann, *Beiträge zur Begründung einer rationellen Fütterung der Wiederkäuer* (1860-64) and *Neue Beiträge* (1870-71).

HENNEGAU, hən'ne-gou. See HAINAUT.

HENNEPIN, ĕn'pān', LOUIS (c.1640-c.1706). A Belgian missionary and explorer in America. He was born at Ath in Hainault and at an early age joined the Recollet branch of the Franciscan Order, becoming a successful preacher in Belgium and northern France. In 1675 he embarked for Canada in the same ship with La Salle, the explorer, and Bishop Laval, of Quebec. The following year he was in the Indian mission of Fort Frontenac and visited the Mohawk country. In 1678 he accompanied La Salle's expedition to Niagara and the upper lakes and constructed a vessel in which they proceeded by the Erie, Huron, and Michigan lakes to St. Joseph's River, which they navigated in canoes. Reaching the Illinois, they built Fort Crève-cœur. Here, in February, 1680, La Salle left them, and Hennepin and his party proceeded down the Illinois to the Mississippi. They were captured by the Sioux and carried up the Mississippi, but were soon released, and Hennepin returned to Quebec. During this journey Hennepin discovered the Falls of St. Anthony, July 3, 1680, and one of his party penetrated as far as Lake Superior. Hennepin soon after sailed for France, where he published his *Description de la Louisiane* (1683-84), containing an account of La Salle's expedition and of the missionary's own discoveries. Hennepin refused to return to America, though ordered to do so by his superiors of the church, and took refuge in Holland. After La Salle's death Hennepin published his *Nouvelle découverte d'un très grand pays situé dans l'Amérique*. In this he claimed to have been the first man to descend to the mouth of the Mississippi—a statement which was easily proved to be false. His works won great popularity and were translated into several languages. Hennepin died at Utrecht about the year 1706. For his life and discoveries, consult: Saint-Genois, *Les voyageurs belges du XIII au XIX siècle* (Brussels, 1867); Van Hulet, *Notice sur le père Louis Hennepin* (Liège, 1845); Shea, *Discovery of the Mississippi* (New York, 1852); Parkman, *La Salle and the Discovery of the Great West* (12th ed., Boston, 1887). Winsor, *Narrative and Critical History of America*, vol. iv (ib., 1884), contains a full account of Hennepin.

HENNEPIN CANAL. See CANAL.

HENNEQUIN, ĕn'kān', ALFRED (1842-87). A French dramatist, born at Liège, Belgium. He was a pupil at the school of mines in his native town and practiced engineering, but after 1875 confined himself to playwriting. His early works include: *J'attends mon oncle* (1869) and *Les trois chapeaux* (1870). His first Parisian success was *Le procès Vauradieu* (1875). This was followed by *Les dominos roses* (1876), with Delacour; *Bébé* (1877), with Najac; *Nounou* (1879); *Niniche* (1878); *Lili* (1880); *La femme à papa* (1885)—the last three in collaboration with Albert Millaud—and many other gay, daring comedies.

HENNER, ĕnār', JEAN JACQUES (1829-1905). A French figure and portrait painter. He was born at Bernwiller, Alsace, and first

studied design with Gutzwiller at the College of Altkirch. He then became a pupil of Guérin at Staatsbourg and studied also the old masters there and at Basel, where he was attracted by the light-and-shade effects of Holbein. At Paris he studied in the Ecole des Beaux-Arts under Drolling and Picot and won the Prix de Rome in 1858 with "Adam and Eve Finding the Body of Abel." In Italy he was especially influenced by Correggio, and from Rome he sent home the "Chaste Susanna," in the Luxembourg Museum. After his return to Paris in 1865 he was soon acknowledged as one of the foremost representatives of the Classical school in France. Among many medals he received the Grand Prix at the Exposition of 1900; he was chosen member of the Institute in 1889, and Grand Officer (the highest rank) of the Legion of Honor in 1903. Henner has well been called the "Modern Correggio"; for he is the painter par excellence of soft velvety flesh tints vibrating in light, contrasted with warm shadows. His favorite subjects are nudes, usually in woodland surroundings in the evening light, or else highly subjective portraits of women with the same pronounced contrast of light and shadow. He has a curious predilection for reddish hair because of its luminous qualities. Among his best nudes are "Biblis Changed into a Spring," a "Reclining Nymph," a "Naiade," in the Luxembourg; "Bara," in the Petit Palais, Paris. Among portraits and figure subjects are "The Blue Ribbon," "The Little Rider," "Magdalen," in the Petit Palais, and, among other portraits, "La Comtesse Diane," in the Luxembourg. He is well represented also in several French provincial museums and in the Metropolitan Museum, New York, the Brooklyn Institute Museum, the Pennsylvania Academy, and the Corcoran Gallery, Washington. Consult Roujon, *Les peintres illustres* (Paris, 1909), and Bénédite, *Gazette des beaux arts*, vols. xxxv-xxxix (ib., 1906-08)—the best account.

HENNESSY, JOHN ALOYSIUS (1859-). An American journalist and political reformer, born at Waterford, Ireland. He was early a reporter on the *New York Mail and Express* (now *Evening Mail*), and later night city editor and managing editor of the *New York Press*, until 1912. He served in the State Assembly in 1893. During Mayor Low's administration Hennessy exposed the padding of city pay rolls, and at Mayor Gaynor's request he reduced the cost of publishing the *City Record* more than \$700,000. Appointed Executive Auditor by Governor Sulzer in 1913, he investigated the State Highway and other departments against which charges of extravagance or corruption had been made, and in the same year he was prominent in defeating the Tammany mayoralty campaign. In 1914 he was a candidate at the direct primaries for the Democratic gubernatorial nomination, but lost to Martin H. Glynn (q.v.).

HENNET, ĕ'ná', CHEVALIER ALBERT JOSEPH ULIPIEN (1758-1828). A French economist, born at Maubeuge. When he was 19, he became supernumerary in the Ministry of Finance under Necker, and, although a Royalist at heart, acted with such prudence through both Republic and Empire that he became Chief Commissioner of Finance and held that post from 1813 to 1816. He is well known for his work on finance, including *Théorie du crédit public* (1816) and *Essai d'un plan des finances* (1816), which, however, are largely colored by his partisan views,

and also wrote a *Cours d'astronomie* (1820) and some critical work, of which *La poésie anglaise* (1806) may be mentioned.

HENNIGES VON TREFFENFELD, hē'nē-gēs fōn trēff'en-fēlt, JOACHIM (c.1625-88). A Brandenburg general. He especially distinguished himself in Alsace (1674), was the first to be ennobled by the Elector of Brandenburg, and in 1679 was promoted to the rank of general for his defeat of the Swedish army near Tilsit. In 1890 the chief Brandenburg regiment was named after him. For his biography, consult Kessel (Stendal, 1863) and Bussler (Gotha, 1897).

HENNINGSEN, CHARLES FREDERICK (1815-77). An English soldier of fortune and man of letters. In 1834 he took service in the Russian army. He joined Kossuth in the Hungarian revolt, came to the United States, and fought with Walker in Nicaragua. At the outbreak of the Civil War he entered the Confederate army as a colonel. He was promoted to be brigadier general and directed the manufacture of the first Minié rifles made in the United States. He was the author of *Revelations of Russia* (1845); *The Past and Future of Hungary* (1852); and several other works, published chiefly in England.

HENOCH, hā'nōg, EDUARD HEINRICH (1820-1910). A German physician, born and educated at Berlin, where he became privatdocent in 1850 and professor eight years later. Associated with Romberg at the Polyclinic, he edited that physician's *Klinische Ergebnisse* (1846). In 1872 he became director of the clinic for children's diseases in the Royal Charité and retired in 1893. A form of purpura, which he described, is known by his name. He wrote: *Klinik der Unterleibskrankheiten* (3 vols., 1852-58; 3d ed., 1863); *Beiträge zur Kinderheilkunde* (1861; new ed., 1868); and the well-known *Vorlesungen über Kinderkrankheiten* (1881; 11th ed., 1903).

HENOtheism (from Gk. *ēis*, *heis*, one + *theos*, *theos*, god). This term is used in three senses: (1) a religion where only one god is worshiped, but others are acknowledged to exist, as in the early Hebrew religion; (2) religions where the various gods represent a divine unity; (3) where the worshiper assigns all divine power to whatever god he chances at the time to be worshiping. In this sense the Vedic hymns present the classic illustrations. This tendency is doubtless more apparent than real. It was but natural that in a hymn to Indra or to Agni the thought of the bard should be focused on the deity in question so that special honors and powers should be assigned him, whichever god he might be. Again, as the religion of the Vedic period was preëminently a nature worship, it is probable that the changes of the seasons led to the apparent exaltation of certain divinities at one time of the year and to their apparent dethronement at another time. There was consequently no constant lord of the Vedic pantheon until the rise of the philosophical speculations which characterized the close of the Vedic age. The origin of henotheism is based on the syncretistic trend of the Hindu mind. It is noteworthy that it is the later deities especially who are treated henotheistically, and herein lies the key to the problem. The Vedic poets, long before the Rig-Veda had been completed, rising in their religious concepts from a low stage of nature worship and crematheism, or worship of material objects, especially useful ones, identified each and every god, and at a

later age all living creatures and all things, with the All-Soul (called Atman, Brahma, etc.). Each god, being therefore a phase of the supreme deity and not a distinct divinity, might receive as the temporary representative of the All-Soul precisely the same attributes as any other god, controlled, however, by the traditional views held by the priests or the people concerning him. Kathenotheism has also been used for this quality in the Vedic religion. Both terms were introduced by Max Müller, in *Lectures on the Origin and Growth of Religion* (New York, 1879).

The same religious phenomenon occurs elsewhere, as in the philosophical aspects of Greek religion. The term is sometimes used to denote the conception of a special god for each nation or tribe. Nowhere else, however, does henotheism become a distinctive trait of the faith as it did in India. After the close of the Rig-Vedic period it practically vanishes, since by that time the esoteric unitarianism on which it was based had permeated the entire body of the religious and philosophical thought of India. As a term, henotheism is scarcely a fortunate one, and many scholars prefer to call the religious impulse syncretism instead. Consult Hopkins, "Henotheism in the Rig-Veda," in *Classical Studies in Honor of Henry Drisler* (New York, 1894), and Jastrow, *The Study of Religion* (New York, 1901).

HEN'RI, hēn'ri, ROBERT (1865-). An American portrait, figure, and landscape painter, the most important of the younger men in the early twentieth century. He was born in Cincinnati, Ohio, and studied at the Pennsylvania Academy of Fine Arts, Philadelphia, and at the Académie Julian and the Ecole des Beaux-Arts, Paris. After several years of travel and independent study in France, Italy, and Spain, he settled permanently in New York. He was elected a member of the National Academy of Design (1906), the Association of American Painters and Sculptors, and the National Institute of Arts and Letters. Among his best-known paintings are: "The Equestrian," Carnegie Art Institute, Pittsburgh; "Young Woman in Black," Art Institute of Chicago; "Girl with Fan," Pennsylvania Academy of Fine Arts, Philadelphia; "Laughing Girl," Brooklyn Institute Museum; "Spanish Gypsy," Metropolitan Museum, New York; "Snow" (1899), Luxembourg Gallery, Paris. Other important works are: portrait of Mrs. Robert Henri; portrait of an artist; "The Picador"; "A Little Gypsy"; portrait of Mrs. W. R. Clarke (1909); "The Fish-Market Man" (1911); "La Madrilénita" (1912); "The Working Man" and portrait of W. W. Kean (both in 1913). In 1914 he exhibited several ingratiating studies of Irish types. Of these "Himself" and "Herself" were shown at the Pennsylvania Academy, and "Herself," an Irish washerwoman, received the medal for the best portrait in the exhibition.

Henri became the foremost and best-known representative of the radical movement in American art. His art is highly individual, and its chief characteristics are sincerity of purpose and simplicity of means. The brushwork is broad and vigorous, the color subdued yet luminous, the tonal effects good. His landscapes are daring and original interpretations of nature, and his figure pieces and portraits are strongly characterized, with remarkable psychological insight. As head of the New York School of

Art, or the "Independent School," Henri has exercised a wide influence upon such artists as Bellows and Glackens.

HENRI III ET SA COUR, ɛ̃n'rɛ' trwà à sà koor (Fr., Henry III and his Court). A prose drama by the elder Dumas, produced Feb. 11, 1829.

HENRIADE, ɛ̃n'rɛ-ád', LA. An epic poem of 10 cantos in Alexandrine couplets, by Voltaire, begun during his confinement in the Bastille in 1717 and first printed at Rouen in the winter of 1722-23 under the title *Poème de la Ligue*.

HENRICI, hɛn-rɛ'tsɛ, CHRISTIAN FRIEDRICH (1700-64). A German poet (also called Picander), born at Stolpen, near Dresden, and educated at Wittenberg and Leipzig. He occupied a position in the Postal and then in the Tax department of Saxony. He is now remembered for his hymns, some of which, notably *Wer weiss wie nahe mir mein Ende*, are still sung. Besides these, he wrote some satirical poems, flat and vulgar, e.g., *Ernstschmerzhaftes und satyrische Gedichte* (1727-37) and *Teutsche Schauspiele* (1726)—obscene dramas, nevertheless of some value in the history of culture. He also wrote the text for Bach's *St. Matthew Passion* (1729). Consult Flossmann, *Picander* (Leipzig, 1899).

HENRICIANS, hɛn-rish'anz, or **HENRICANS**. The followers of Henry of Lausanne, or Henry the Deacon. Grieved at the corruption of the times, Henry left the Benedictine monastery of Clugny, to which he belonged, in southern France. His consistent life and the eloquence of his discourses deeply moved the people. At first Hildebert, his Bishop, favored him, but afterward drove him from Le Mans. Joining the disciples of Peter of Bruys (see BRUYS, PIERRE DE) in Provence, he was arrested by the Archbishop of Arles and at the second Council of Pisa (1135) was declared a heretic and placed in a cell. His doctrine seems to have been an insistence upon personal responsibility in religion, and the rejection of the rites and authority of the Church. Subsequently released, he again went to the south of France, where he had a great influence over the lower classes. He was arrested by Pope Eugenius III and at the Council of Rheims (1148) condemned to perpetual imprisonment. He died in prison in 1149.

HENRIETTA. A city and the county seat of Clay Co., Tex., 96 miles northwest of Fort Worth, on the Little Wichita River, and on the Fort Worth and Denver City, the Southwestern, and the Missouri, Kansas, and Texas railroads (Map: Texas, C 3). As the centre of an agricultural and stock-raising country, Henrietta has a considerable trade in cotton, grain, and live stock; and its industrial establishments include grain elevators, flour mills, cotton gins, cottonseed-oil mill, lumber yards, etc. Building stone is quarried, and natural gas is found in enormous quantities in the vicinity. The water works are owned by the city. Pop., 1900, 1614; 1910, 2104.

HENRIETTA MARIA (1609-66). The queen consort of Charles I of England and daughter of Henry IV of France. She was married to Charles in 1625. The early years of their married life were unhappy because Charles failed to relieve the English Catholics, as he had promised in the marriage contract. The children of the marriage were Charles II; Mary,

Princess of Orange; James II; Elizabeth; Henry, Duke of Gloucester; and Henrietta, Duchess of Orléans. Although at first the Queen occupied her time with amusements and plays, later she was very active in political intrigues and in efforts to promote her religion in Great Britain. Protestants were alarmed by her activity. She advised Charles to coerce Parliament, endeavored to save Strafford from his fate, and raised a considerable sum to aid her husband against the Scots. Her attempts to gain support on the Continent, especially from the Pope, were but partly successful. She was in France when Charles was executed (1649) and did not return to England until the Restoration (1660). In 1665 she went back to France and died there the next year. For her portrait, see Plate of VAN DYCK. Consult I. A. Taylor, *The Life of Henrietta Maria* (2 vols., London, 1905), and H. Haynes, *Henrietta Maria* (New York, 1912).

HENRIOT, or **HANRIOT**, ɛ̃n'rɛ'ô', FRANÇOIS (1761-94). A French politician, born at Nanterre, nicknamed, by Marat, *Sauveur de la Patrie*. He was educated as a choir boy, and little is known of him until 1789, when he left his post in the city employ and joined the *sans-culottes*, who made him one of their commanders. He was a leader in the massacres of the Carmes and Saint-Firmin (1792), and in the following year was appointed by the Commune provisional general of the army in Paris. A year later he resigned from this post and was elected general of the National Guard three weeks afterward, but refused to "command the army against the people." He was one of Robespierre's right-hand men. In 1794 his arrest was ordered on the suggestion of Tallien and Delmas; he made a bold attempt to rouse the mob in his behalf, but was taken and guillotined with Robespierre.

HENRIQUEL-DUPONT, ɛ̃n'rɛ'kɛl' du'pɔn', LOUIS PIERRE (1797-1892). A French designer and engraver. He was born in Paris, studied painting at the Ecole des Beaux-Arts and with Pierre Guérin, and engraving under Bervic. His first production was a portrait of his father (1818), and his "Portrait of a Young Woman with her Daughter," after Van Dyck, gained the second medal at the exhibition of 1822. He produced in succession a "Portrait of M. de Pastoret"; "Strafford"; "The Interment of Christ," after Paul Delaroche; "The Abdication of Gustavus Vasa," after Hersent; "The Disciples at Emmaus," after Paul Veronese; "The Marriage of St. Catharine," after Correggio; and other works. Ten years of his life were employed in reproducing the "Hemicycle" of Paul Delaroche (q.v.). He was considered the most eminent French engraver of the day; his work is characterized by accuracy of design and purity of style. He became member of the Academy in 1849 and professor at the Ecole des Beaux-Arts in 1853 and was elected an honorary member of the Royal Academy of London in 1869.

HENRÍQUEZ, ɛ̃n-rɛ'káth, FRANCISCO FERNÁNDEZ DE LA CUEVA. See FERNÁNDEZ DE LA CUEVA HENRÍQUEZ, FRANCISCO.

HEN'RY (named in honor of Joseph Henry). The practical unit of induction in the measurement of self and mutual induction. (See ELECTRICITY; ELECTRICAL UNITS.) It is the induction in a circuit if the induced electromotive force in it is one volt when produced by the

variation of a current at the rate of one ampere per second. The henry is therefore substantially 10^9 times the C. G. S. electromagnetic unit of induction.

HENRY I (c.876-936). King of the Germans from 919 to 936, surnamed the Fowler. He was the son of Otho, Duke of Saxony, and was distinguished in early youth for the courage and energy with which he warred against the Slav tribes to the east of his native duchy. Otho, who died in 912, appointed Henry his successor, not only as Duke of Saxony, but as Lord of Thuringia and part of Franconia. The German King Conrad I, instigated by certain ecclesiastical advisers whom Henry's independent bearing towards the Church had deeply offended, resisted the claims of the young Duke; but the latter was ultimately left in possession of all the lands over which his father had ruled. After Conrad's death Henry, to whom Conrad had sent the royal insignia, was chosen King by the Franconian and Saxon nobles (919), and he had little difficulty in securing the acquiescence of the rest of Germany. For some years Lotharingia, or Lorraine, had held an uncertain position between the kingdoms of the East and the West Franks, as Germany and France were then called; but in 925 Duke Giselbert transferred his allegiance from the French to the German King. From the time of Louis the Child, Germany had been exposed to the inroads of the Hungarians. In 924 Henry had to purchase a truce of nine years by agreeing to pay an annual tribute to the Hungarians. The King made use of this respite by preparing his subjects for a final struggle with the barbarous invaders. In the northern districts the Germans had hitherto lived for the most part in small villages or on separate settlements. Henry began building fortified cities throughout Saxony and Thuringia, and in the remaining duchies his example was followed. He also trained his vassals to meet the enemy on horseback, thus giving a strong impetus to the movement which resulted in the institution of chivalry. When his arrangements were complete, he tried his new force in a contest with the Danes and with some Slav tribes, whom he utterly defeated. In 933 the Hungarians demanded as usual the tribute which had till then been punctually paid, and when it was refused invaded Thuringia with a great army. Henry defeated them so decisively that they did not again enter Germany for some years and were never again seen in the northern duchies. In 934 Henry fought against the Danes and compelled their King to pay tribute. In the internal affairs of the realm he acted with great precaution and judgment. The dukes by this time had become so powerful that there was some danger of their altogether overshadowing the throne. Instead of directly forcing them to submission, as was afterward done by his son Otho, he attached them to his interests by confirming them in many of their rights and by acting as a mediator in their disputes. Towards the close of his life his position was so secure that he resolved to go to Rome either on a pilgrimage or to claim the Imperial crown; but he died of apoplexy, July 2, 936. Consult Waitz, *Jahrbücher des deutschen Reichs unter Heinrich I.* (3d ed., Leipzig, 1885), and Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. i (ib., 1881).

HENRY II (973-1024). Holy Roman Em-

peror from 1002 to 1024. He was the son of Henry the Quarrelsome, Duke of Bavaria, and a great-grandson of Henry I (q.v.). He was in Italy with Otho III in 1001 and upon the latter's death, in January, 1002, hastened to secure possession of the Imperial power with the aid of the Archbishop of Mainz. He was crowned at Mainz (June, 1002). His most determined enemy during the greater part of his reign was Boleslas Chrobry (the Brave) of Poland, who annexed Bohemia, and during the King's absence in Italy, in 1004, invaded Lusatia and Meissen. Henry hurried back, defeated Boleslas in 1005, and granted Bohemia as a fief to Jaromir, of the native house of the Premyslides. Boleslas, however, continued the war, which was not ended until 1018, when Henry was obliged to conclude peace on terms favorable to the Polish King. In the midst of this struggle he had to make war on Adalbero, his wife's brother, who had seized the Archbishopric of Treves and was protected in his claim by another brother of the Empress, the Duke of Bavaria. Both were overcome and deprived of their dignities, although Bavaria was ultimately restored to the elder of the two brothers. Henry also put down rebellions in Flanders and Meissen, and probably concluded, in 1006, a treaty with Rudolph III of Burgundy, whereby, after Rudolph's death, his territories were to be united to Germany. In 1013 Henry went for the second time to Italy, where Arduin had raised himself to the throne. The usurper was displaced, and in 1014 Henry was crowned Emperor at Rome by Benedict VIII, whom he had confirmed in the papal see in opposition to the Antipope Gregory. At the request of Benedict the Emperor returned to Italy in 1022, in order to drive back the Greeks, who were steadily pressing northward. Henry died July 13, 1024, and was canonized by Pope Eugenius III in 1146. His wife, Kunigunde, was also ranked among the saints. Henry founded the bishopric of Bamberg, which was given very great privileges, and which the Pope took under his immediate protection. Consult Hirsch and Bresslau, *Jahrbücher des deutschen Reichs unter Heinrich II.* (3 vols., Leipzig, 1862-74), and Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. ii (ib., 1885).

HENRY III (1017-56). Holy Roman Emperor from 1039 to 1056. He belonged to the Franconian or Salic line and was the son of Conrad II. He was crowned Duke of Bavaria in 1027, King of the Germans as successor presumptive to his father in 1028, Duke of Swabia and King of Burgundy in 1038, and became King of Germany at his father's death, in 1039. Henry possessed great natural abilities, had been educated with the utmost care, and succeeded to an exceptionally strong dominion. The three duchies of Franconia, Swabia, Bavaria, as well as Carinthia, were at first in his own hands, and two only, Saxony and Lorraine, had semi-independent dukes. Under him the German Empire attained to very great power. Poland was a subject principality, the Bohemian Duke was compelled to become Henry's vassal in 1041, and for a time the King of Hungary acknowledged his overlordship. In Italy Drogo the Norman became his vassal for Apulia. In 1046 Henry made his first expedition to Italy, summoned to end the troubles caused by the three rivals for the papal throne, Benedict IX, Gregory VI, and Sylvester III. All three were

deposed. Henry was asked to appoint a new Pope, and during the remainder of his reign the occupants of the papal chair were nominated by him. He was crowned Emperor at Christmas, 1046. From this time on, however, Henry was compelled constantly to face revolts in different parts of his dominions. The revolt of Godfrey in Lorraine proved exceedingly formidable, but Henry ultimately triumphed. He died on Oct. 5, 1056. Henry was deeply devoted to the Church and earnestly endeavored to reform the clergy. He aided the papacy in securing the power which was to be so dangerous to his son; but during his life the popes and the Emperor worked in harmony to check the abuses in the Church. Consult Steindorff, *Jahrbücher des deutschen Reichs unter Heinrich III.* (2 vols., Leipzig, 1874-81), and Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. ii (5th ed., ib., 1885).

HENRY IV (1050-1106). Holy Roman Emperor from 1056 to 1106. He was the son of Henry III and was born Nov. 11, 1050. He had been crowned in 1054 and, although only six years old at his father's death, was recognized at once as King of Germany, Italy, and Burgundy, his mother, Agnes of Poitou, ruling in his name. Henry III had exercised great power over the Church and had greatly strengthened the papacy; in Germany he had held the nobles in subjugation against their will. Now both the Church and the nobles seized the opportunity to achieve their independence. The brother of Godfrey of Lorraine (see HENRY III) was elected Pope as Stephen IX, and Godfrey was made Imperial Vicar in Italy. Agnes was not strong enough to rule effectively. She was forced to cede Lorraine to Godfrey and to bestow upon the most powerful of the nobles the great southern duchies of Swabia and Bavaria, as well as Carinthia, thus undoing the work of Conrad II (q.v.). Her authority was not recognized in Italy. Even the bishops in Germany, who had been the chief instruments of her husband, deserted her. In 1062 Anno, Archbishop of Cologne, seized Henry by treachery and governed in his name. Under Anno's regency the German authority was reestablished over Hungary. The Archbishop, however, was greatly disliked by Henry and was forced to make way for the Archbishop Adalbert, of Bremen, who became the young King's tutor and in 1065 caused him to be declared of age. Henry had been brought up very badly. He had ability, but an ungovernable temper; he was brave, but a poor general; he was surrounded by flatterers and at first gave himself up almost entirely to pleasure. Germany soon sank into a state of feudal anarchy. The Slavs revolted and devastated the northeastern parts of the Empire, while the Danes held the Baltic coast. Henry attempted to reestablish his authority by degrading the independent dukes in the south, by imprisoning the Duke of Saxony, and by erecting many fortresses in his duchy. The Saxons revolted in 1073, instigated in large measure by their bishops, and Henry barely escaped from their hands. The nobles in the north aided him against Saxony, and in June, 1075, he won a great victory on the Unstrut which temporarily crushed the rebellion; for the first time he seemed to be really powerful.

But the greatest danger came to a head just at this time. After the death of Henry III the papacy had gradually freed itself from Imperial

control. In 1059 a decree had been enacted which gave the election of the Pope to the college of cardinals, and during the period of disorder in Germany the Church, under the guidance of Hildebrand, had gained steadily in power. In 1073 Hildebrand was elected Pope as Gregory VII (q.v.) and proceeded with greater energy to carry out the policy of ecclesiastical and papal supremacy with which he had been identified so closely under the two preceding popes. In 1075 a synod at Rome passed a decree against lay investiture, threatening with excommunication secular princes who should presume to confer abbacies or bishoprics on priests. The bishops and abbots in the Empire held great possessions and were great territorial lords. If Henry could not control their appointment, a large part of his resources and power would be taken from him, and a large section of the Empire would become independent. As long as the bishops and abbots continued to hold their temporal possessions as fiefdoms, it was absolutely necessary to the King to have them under his control. On the other hand, the Church was determined to appoint its own officials. When Henry therefore appointed an archbishop for Milan, Gregory sent legates to demand that he should obey the decree against lay investiture, charging him at the same time with simony and oppression of the clergy. Henry, however, was elated by his great victory over the Saxons and in no mood to temporize, as he had done previously. He retorted by convoking a German council at Worms, Jan. 24, 1076, which deposed the Pope. The Pope in return excommunicated Henry, decreed his deposition, and released his subjects from their oath of allegiance. All of Henry's enemies seized this opportunity to revolt and proposed to elect a new king, and the most that Henry could obtain was a respite. He was deprived of all authority, and if not absolved within a year was to be deposed.

The Pope seemed to be entirely triumphant, and Henry doomed to degradation; but there was one weak point in Gregory's position which afforded Henry a chance of redeeming his fortunes. As a Christian priest, the Pope was bound to pardon a penitent who sought absolution; when, therefore, Gregory, who had promised to take no action without the consent of the German nobles, with whom he was to hold a council, set out for Germany, Henry hurried to Italy to meet him. The Lombards, who were hostile to the Pope, welcomed the Emperor eagerly, and he might have had an army at his command. Gregory took refuge in the strong castle of Canossa, belonging to Countess Matilda of Tuscany. Henry, however, had not come to fight, but to seek absolution. For three days (Jan. 25-27, 1077) he begged admission to Canossa as a penitent, waiting at the gate of the courtyard of the castle; and finally Gregory had to yield and to grant the desired absolution. Canossa was the deepest possible humiliation for Henry, but his act had won for him, a diplomatic victory. He had prevented the meeting between Gregory and the nobles and had placed the latter in the position of rebels if they persisted in their hostility.

Many of them did persist and elected an anti-king in the person of Rudolph, Duke of Swabia; but Henry now had many partisans. Civil war raged throughout Germany, and every part of the country except Saxony was divided into two

parties. Gregory VII hesitated, but finally in 1080 recognized the antiking and excommunicated Henry once more. Rudolph, however, was killed soon after, and his death was accepted as a judgment of God. An antipope, Clement III, was elected by the Imperial party, and in 1084 Henry captured the city of Rome and installed the antipope, who gave him the Imperial crown; but in the same year the Emperor, who had been besieging Gregory VII in Sant' Angelo, was driven from Rome by Robert Guiscard (q.v.). Gregory VII died soon after in exile. The strife went on in Germany, where Henry had to contend against two other antikings—Hermann of Luxemburg, who died in 1088, and the Margrave of Meissen, whose death occurred in 1089. Supported by Godfrey de Bouillon (q.v.) and Frederick of Swabia, the ancestor of the Hohenstaufen, Henry was on the whole successfully asserting himself, when his eldest son, Conrad, joined the Emperor's enemies. For a time this weakened the Emperor, but he gradually won the support of the great nobles, all of whom were weary of the strife. Conrad was deposed from his position as heir to the throne, and died in 1101; and Henry, the second son of the Emperor, was declared heir. Henry's difficulties, however, were not over. The Pope, Paschal II, renewed the excommunication against Henry. His second son was induced to rebel, and the Emperor was made prisoner and forced to abdicate (December, 1105). He died soon after (Aug. 7, 1106) while preparing to make war upon his son. As he died excommunicated, his body remained unburied for five years. During the latter part of his life especially, he was very popular with the people, who mourned his loss. Consult: Meyer von Knonau, *Jahrbücher des deutschen Reiches unter Heinrich IV. und Heinrich V.* (Leipzig, 1890-1909); Floto, *Heinrich IV. und sein Zeitalter* (2 vols., Stuttgart, 1855-56); Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. iii (5th ed., Leipzig, 1890); also the authorities referred to under GREGORY VII. See INVESTITURE.

HENRY V (1081-1125). Holy Roman Emperor from 1106 to 1125. He was the second son of Henry IV and was appointed his father's successor in 1098 after his elder brother, Conrad, had forfeited his right to the throne by rebellion. Six years afterward he himself rebelled against the Emperor. The papal party, with which he allied himself, took for granted that, when he mounted the throne, church and state would instantly be reconciled; but their hopes were disappointed. The main point for which Henry IV had contended was the right of investing the bishops with ring and staff. When Henry V succeeded him in 1106, Pope Paschal II demanded that this right should be given up; but Henry replied that he could not resign powers that had been exercised by his predecessors, and the loss of which would imply that the ecclesiastical lands of Germany would be removed from secular control. In 1110 he entered Italy at the head of 30,000 men. Paschal proposed that the Church should give up its property and feudal privileges if Henry would renounce the right of investiture. To this the latter agreed, and a day was appointed for the coronation of Henry as Emperor. The opposition of the Roman prelates made it impossible for the Pope to proceed with the ceremony, whereupon he and his cardinals were made prisoners. Paschal then formally recognized the

right of investiture, and Henry received the Imperial crown. When the Germans had recrossed the Alps, Paschal renounced the treaty he had concluded, and the Emperor was excommunicated. As many of the princes were pleased to avail themselves of this opportunity for rebelling, Germany again became the scene of confused contests like those which had plunged the country into misery during Henry IV's long reign. In 1116 the Emperor went a second time to Italy and drove Paschal from Rome, and after Paschal's death he caused the election of Gregory VIII. The papal party, however, selected Gelasius II, who renewed the sentence of excommunication against Henry. The latter returned to Germany in 1119 and at the Diet of Tribur succeeded in allaying the hostility of the more important among his enemies. Pope Calixtus II, who succeeded Gelasius in 1119, now found it necessary to offer a compromise; and the controversy between the Empire and the papacy was for the time closed by the Concordat of Worms (1122), in which it was agreed that at every election of a prelate in Germany the Emperor should have the right of being present in person or through a representative, and that the chosen bishop or abbot, before being consecrated, should receive his lands and secular authority in fief of the crown. In the other parts of the Empire the election was to be free and canonical, and the Emperor to confer the secular authority after the consecration. Henry died at Utrecht, May 23, 1125. Consult: Giesebrecht, *Geschichte der deutschen Kaiserzeit*, vol. iii (5th ed., Leipzig, 1890), and Meyer von Knonau, *Jahrbücher des deutschen Reiches unter Heinrich IV. und Heinrich V.* (7 vols., Leipzig, 1890-1909). See INVESTITURE.

HENRY VI (1165-97). Holy Roman Emperor from 1190 to 1197. He was the son of Frederick Barbarossa and was crowned King in 1169. He assumed control of the government on his father's departure for the Holy Land in 1189 and on the latter's death, in the following year, succeeded to the throne. He shared the intellectual culture of his time and was distinguished for the splendor of his political schemes; but he was of a stern disposition and in order to attain his ends was guilty of cruelty. Henry the Lion (q.v.), who had been banished to England by Frederick I, had returned to Germany in 1189 and again disturbed the country with his wars. King Henry, after restoring peace, hastened to Rome, where he was crowned Emperor in 1191. Through his wife, Constance, he had a claim to the throne of Sicily; but the Sicilian nobles made Count Tancred, an illegitimate son of Constance's brother, King. After receiving the Imperial crown Henry advanced against Tancred. He was successful in Sicily, but before Naples his army was struck by pestilence, and he was forced to return to Germany. There he suppressed various private wars and compelled Henry the Lion to acknowledge his supremacy. The great ransom which he received from Richard I (q.v.) of England enabled him to fit out a large army, and with this he descended upon Italy in 1194 and without much difficulty conquered the Sicilian kingdom. Tancred was dead, but he had left a number of relatives, who were so barbarously treated that the people were seized with terror. On his return to Germany it was easy for Henry, with the prestige which he had now acquired, to enforce submission; and so great was his authority that,

in 1196, he endeavored to secure the declaration that the crown be made hereditary in his family. Had he lived some years longer, he would probably have succeeded, but he died suddenly at Messina, Sept. 28, 1197. His power was greater than that wielded by any other German Emperor. Aside from his firm control over the Imperial lands, Sicily had been subdued, and Richard of England, the King of Cyprus, and Bohemond of Antioch had become his vassals. Consult: Toeche, *Jahrbücher des deutschen Reichs unter Heinrich VI.* (Leipzig, 1867); Bloch, *Forschungen zur Politik Kaiser Heinrich VI., 1191-1194* (Berlin, 1892); Kneller, *Des Richard Löwenherz deutsche Gefangenschaft* (Freiburg, 1893).

HENRY VII (c.1269-1313). Holy Roman Emperor from 1308 to 1313, the first of the line of Luxemburg. He was the son of Duke Henry III of Luxemburg, and succeeded Albert I as German King in 1308, being crowned at Aix-la-Chapelle in the following year. When he came to the throne, Bohemia was subject to Henry of Carinthia, who was greatly disliked by his subjects. The King displaced him in 1310 and enriched his own family by granting Bohemia, at the request of the Bohemians themselves, to his son John, whose claims were rendered secure by his marriage with Elizabeth, the daughter of Wenceslas II. For some time no German king had sought the Imperial crown; but Henry resolved to revive the traditions which were dying out, and with a view to this result did what he could to compose the differences between the nobles and to gain their allegiance. He was welcomed in Italy with eagerness by the Ghibellines, whose great poet, Dante, saw in Henry VII the savior that was to rescue Italy from anarchy and to bring it peace and honor. The *De Monarchia* of Dante was probably written at this time. In 1312 Henry was crowned Emperor at Rome, having previously received the iron crown of Lombardy in Milan. He was preparing to undertake an expedition for the conquest of Naples, when he died suddenly, near Siena, Aug. 24, 1313. It was generally believed at the time that he had been poisoned by a Dominican monk, but this was not proved. Consult: Dönniges, *Acta Henrici VII.* (Berlin, 1840-41); Barthold, *Der Römerzug König Heinrichs von Lützelburg* (2 vols., Königsberg, 1830-31); Pöhlmann, *Der Römerzug Kaiser Heinrichs VII.* (Nuremberg, 1875); Gräfe, *Die Persönlichkeit Kaiser Heinrichs VII.* (Leipzig, 1911).

HENRY I (1068-1135). King of England from 1100 to 1135. He was the fourth son of William the Conqueror and was born, according to tradition, at Selby in Yorkshire. Unlike his elder brothers, Robert and William Rufus, he was of a studious disposition and received what was for the times an excellent education, being known later in history as Beaulerc. At his father's death he received £5000, but no lands. With £3000 he bought from his brother Robert, Duke of Normandy, the Cotentin and displayed great ability in the government of his territories. In 1091 William Rufus and Robert wrested his possessions from him, after besieging him for a long time in Mont Saint-Michel. For a time he wandered about, a landless man, until the men of the town of Domfront, on the river Varenne, invited him to become their lord. Henry thus obtained possession of a powerful stronghold, which he used as a base of opera-

tions in numerous raids against his brother, the Duke of Normandy, and Robert of Bellême. After 1094 he and William were allies, and in 1096 he received from the latter the counties of Coutances and Bayeux. When William Rufus was found dead in the New Forest, where the two brothers had been hunting, Aug. 2, 1100, Henry at once rode to Winchester and seized the royal treasury, and two days later was crowned at Westminster, publishing a charter of rights which was subsequently taken as the basis of Magna Charta. To strengthen his hold on the crown, he recalled Anselm, the exiled Archbishop of Canterbury, thus gaining the support of the clergy, and by his marriage to Eadgyth, or Matilda, daughter of Malcolm Canmore, King of Scotland, and great-granddaughter of Edmund Ironside, he won the affections of his Saxon subjects. Henry successfully defended the throne against his brother Robert. In July, 1101, the Norman Duke invaded England, and Henry was forced by a conspiracy among his nobles to come to terms with his brother, ceding to Robert all his possessions in Normandy excepting Domfront and granting him a pension. War with Robert broke out again in 1105, and on Sept. 28, 1106, Henry defeated the Duke in a bloody battle before the walls of Tinchebrai and took him prisoner. Robert was confined in Cardiff Castle till his death, in 1134. The acquisition of Normandy added greatly to Henry's strength; but he had some trouble in keeping the duchy, as the French King, Louis VI, and the Count of Anjou took part with William, Robert's youthful son. A desultory warfare was carried on from 1109 to 1120, during which a large part of Normandy was devastated and great atrocities were committed on both sides. The death in 1120 of his son William, whom the King greatly loved, was a severe blow to Henry. To prevent the crown from falling into the possession of his nephew William, he caused his barons in 1126 to accept as his successor in England and Normandy his daughter Matilda, who in 1129 became the wife of Geoffrey Plantagenet, Count of Anjou. Henry died on Dec. 1, 1135, near Rouen.

The reign of Henry I was important for the progress that was made towards the amalgamation of the Saxons and the Normans in England. The feeling of English nationality was greatly stimulated by the wars carried on against the French and the rebellious nobles in Normandy. The King continued the policy of the Conqueror in relentlessly crushing down the opposition of the great nobles and in making himself the champion of the common people against their territorial lords. In carrying out this policy the functions of the *curia regis*, or King's court, were greatly increased, and justices as guardians of the King's peace were sent through the country. The great offices of state were conferred by preference on the members of the clergy. Yet in his struggle with Anselm and other prelates over the rights of nomination and consecration of bishops, the King knew how to keep the virtual power in his own hands without arousing the open hostility of the Church. Henry had great natural ability, especially in the line of state intrigue. He was, however, dissolute, cruel, avaricious, and given to acts of meanness. His influence on English history, nevertheless, was lasting. Consult: Freeman, *The Norman Conquest*, vol. v (Oxford, 1879); id., *William Rufus* (ib., 1882); Norgate, *Eng-*

land under the Angevin Kings (London, 1887); Stubbs, *Constitutional History of England*, vol. i (Oxford, 1897); Davis, *England under the Normans and Angevins* (New York, 1905); Adams, *History of England from the Norman Conquest to the Death of John* (ib., 1905).

HENRY II (1133-89). King of England from 1154 to 1189. He was the grandson of Henry I by his daughter Matilda and her second husband, Geoffrey Plantagenet, and was born March 5, 1133, at Le Mans in Maine. From his birth he was regarded as the successor of Henry I; but on the death of the latter, in 1135, the English crown was seized by Stephen of Blois, and a civil war followed, in which the country was devastated and reduced to anarchy. During his minority Henry's affairs were under the care of his mother, Matilda, and her half brother, Robert, Earl of Gloucester. In 1151 Henry received Normandy from the French King; the death of his father soon after left him master of Anjou, Maine, and Touraine; and by his marriage, in May, 1152, to Eleanor, the divorced wife of Louis VII of France, he added to his possessions the immense territories of Guienne (Aquitaine) and Poitou, so that he was the ruler of more extensive domains in France than the French King himself. In 1153 Henry made an attempt to conquer England. After nine months of fighting it was agreed, by the Treaty of Wallingford, November, 1153, that Stephen should reign during his lifetime, and that Henry should succeed him. Stephen's death occurred the following year, and Henry was crowned Dec. 19, 1154, together with his Queen, Eleanor. The early years of his reign were devoted to the restoration of peace and the reduction of the powerful nobles who had taken advantage of the civil war to make themselves virtually independent of the royal authority. The judicial and financial systems were reorganized, and the crown was freed in great measure from its dependence on the great feudatories by the institution of "scutage," or shield money, as a substitute for personal military service, due from the vassal, thus enabling the King to maintain a standing force subject to his will alone. The chief obstacle in the way of Henry's schemes for the aggrandizement of the royal power was the clergy, whose immunity from the jurisdiction of the secular courts made them a disturbing factor in the judicial administration of the country. To aid him in reducing the Church to submission to the civil power, Henry appointed his trusted Chancellor, Thomas à Becket (q.v.), to the see of Canterbury in June, 1162. Becket, however, to the surprise and indignation of the King, became the most fervent champion of ecclesiastical privilege and repeatedly thwarted the royal measures aimed against the Church. Henry succeeded, nevertheless, in wringing from the bishops a ratification of the ancient customs of the land as re-enacted in the Constitutions of Clarendon in 1164. (See CLARENDON, CONSTITUTIONS OF.) The long struggle with Becket was terminated only by the latter's murder, in 1170. Henry did penance at his grave, allowing himself to be scourged by the monks; but though the Constitutions of Clarendon were formally repealed, the King was ultimately successful in reducing the Church to subordination in civil matters. The administration of justice in the criminal courts was regulated in 1166 by the Assize of Clarendon. See CLARENDON, ASSIZE OF.

During Henry's reign occurred the conquest of Ireland. That country was then the home of a number of tribes or clans, and Pope Adrian IV in 1155, by a bull, is said to have given Henry the authority over the entire island and ordered the inhabitants to obey him. In 1166 the intervention of the English was solicited by one of the Irish petty kings, Diarmuid of Leinster (see MACMURROUGH), and Henry gave leave to any of his subjects to aid him. Robert Fitzstephen, Constable of Alberville, Maurice Fitzgerald, and Richard de Clare, surnamed Strongbow, Earl of Strigul, went over with a few hundred men at arms and in four years conquered the coast region from the North to the Liffey. Their success was rapid, and Henry in 1171 went over himself with an army of 4000 men to complete the conquest of the country. All Ireland except Connaught submitted for the time, but the majority of Irish tribes and chieftains continued to be independent for centuries. During this reign, also, the first ascendancy of England over Scotland was gained. Henry's sons, incited by their mother rebelled against him (1173), and their cause was espoused by the kings of France and Scotland. The latter, William the Lion, was ravaging the north of England with an army, when he was surprised at Alnwick and taken prisoner, July 13, 1174. To obtain his liberty, he stipulated to do homage to Henry for Scotland and to cede to him five of his strongest fortresses. In Normandy, Anjou, and Aquitaine, Henry was equally successful in suppressing the rebellion. In the course of a second rebellion of his sons (1183) Henry, the eldest son, died; Geoffrey the second son, died three years later. Richard Cœur de Lion still remained hostile to his father and with the aid of King Philip Augustus of France drove Henry from Maine and Anjou. Deserted by all his troops, Henry was compelled to come to terms with Richard. On July 4, 1189, peace was concluded at Colombières. One of the stipulations was for an indemnity for all the followers of Richard. The sight of the name of his favorite son, John, in the list, acting upon a constitution weakened by many cares, threw the King into a fever, of which he died, July 6, 1189, at Chinon.

Henry was a man of restless energy, subject to sudden outbursts of a mad temper, but a born ruler, nevertheless, who gave to his subjects justice and peace. During his reign the barons were overawed, and hundreds of their castles were destroyed. Law made very great progress; circuit courts were established, and Henry facilitated the making of appeals to his own courts, in order to bring the people into direct dependence upon the King. The earliest writer on English law, Ranulf de Glanville, was Henry's chief judiciary. In intellect and character he resembled his grandfather, Henry I. He had three illegitimate children; his mistress, the Fair Rosamond (q.v.), may have been the mother of the first of the two that are remembered: William Longsword, Earl of Salisbury and Geoffrey, who became Archbishop of York and who was faithful to him when his four legitimate sons took up arms against him. Henry was a great builder of palaces and roads of the latter, the great embankment, 30 miles in length, erected to prevent floods from the river Loire, still remains in use. He was a lover of learning and an assiduous reader. His great work for England consisted in uniting the cor-

querors and conquered into one race and in laying the foundation for the present Greater Britain by the conquest of Ireland. Consult: Norgate, *England under the Angevin Kings* (2 vols., London, 1887); Stubbs, *Constitutional History of England*, vol. i (Oxford, 1897); id., *The Early Plantagenets* (London, 1886); Mrs. J. R. Green, *Henry the Second* (ib., 1888); Ramsay, *Angevin Empire* (ib., 1903); Davis, *England under the Normans and Angevins* (New York, 1905); Adams, *England from the Norman Conquest to the Death of John* (ib., 1905); L. F. Salzman, *Life of Henry II* (Boston, 1914).

HENRY III (1207-72). King of England from 1216 to 1272. He was the eldest son of King John and of Isabella of Angoulême and was born at Winchester, Oct. 1, 1207. He succeeded his father in 1216, under the regency of William Marshal, Earl of Pembroke. The French Dauphin, who had invaded England during the lifetime of King John, in response to an invitation by a party among the nobles, was defeated in 1217, and the confirmation of Magna Charta in the same year established Henry securely on the throne. The Regent died in 1219, and the chief powers of government were exercised by Stephen Langton, Archbishop of Canterbury, and the Justiciar Hubert de Burgh. The dismissal of Hubert in 1232 was followed by the rule of foreign favorites, which stirred up great dissatisfaction in the nation. Henry was constantly beset with hosts of the Poitevin relations and men from the country of his Queen, Eleanor of Provence, whom he married on Jan. 14, 1236. His weakness was shown also in his failure to make a stand against the ecclesiastical demands of the clergy and the Pope. Schemes for foreign conquest loaded the nation with a heavy debt and increased the general discontent. In 1258 the barons in Parliament, headed by his brother-in-law, Simon de Montfort, Earl of Leicester, rose against him and forced him to transfer his power temporarily to a commission of barons and to enact a number of reforms. He agreed to these demands by the Provisions of Oxford (q.v.). The barons, however, failed to make any use of that power in reforming the state, and the King utilized the opportunity to regain the power which he alleged, with truth, had been taken from him by compulsion, though his action had worn the appearance of free will. The question of the validity of these provisions was submitted by both parties to St. Louis of France, who in the Mise of Amiens (q.v.) annulled the provisions (1264). Leicester and his party refused to be bound by the decision and took up arms against the King. They defeated him and took him prisoner in the battle of Lewes, on May 14, 1264. The battle was followed by an agreement known as the "Mise of Lewes" (q.v.), more humiliating to the King than the Provisions of Oxford. Leicester, being virtual ruler of the country, summoned a Parliament in 1265, to which, for the first time in English history, representatives from both boroughs and shires were called. Knights of the shire had been summoned to Parliament as early as 1254. Leicester's supremacy did not last long. Within a year the powerful Earl of Gloucester deserted his party, and with Prince Edward, the gifted son of the King, who had been taken prisoner at Lewes and succeeded in making his escape, led an overwhelming army against Leicester, who was defeated and slain

at Evesham, on Aug. 4, 1265. During the remainder of Henry's reign affairs were under the control of Prince Edward. The weakness of Henry and his father had allowed the development of the power of the barons, and in the struggle between the two the modern system of parliamentary government arose, marked by the concession of representation to the shires and the boroughs. Statute law dates from the time of Henry III, the Provisions of Merton, passed in the twentieth year of Henry's reign, being the first enactment on the English statute book. Consult: Stubbs, *Constitutional History of England*, vol. ii (Oxford, 1897); Bémont, *Simon de Montfort* (Paris, 1884); Prothero, *Simon de Montfort* (London, 1877); Pauli, *Simon de Montfort* (ib., 1876); Green, *History of the English People* (ib., 1874); Gasquet, *Henry the Third and the Church* (ib., 1905); Tout, *History of England, 1216-1377* (ib., 1905); Davis, *England under the Normans and Angevins* (New York, 1905); K. Norgate, *The Minority of Henry III* (ib., 1912).

HENRY IV (1367-1413). King of England from 1399 to 1413. He was the eldest son of John of Gaunt, fourth son of Edward III, and Blanche, the daughter of Henry, Duke of Lancaster, and was born April 3, 1367, at his father's castle of Bolingbroke in Lincolnshire. He is frequently called Henry of Bolingbroke from the name of his birthplace, but to his contemporaries he was more generally known as Henry of Lancaster. About 1380 he married Mary Bohun, one of the heiresses of the Earl of Hereford. He was distinguished for his martial attainments and became a great favorite with the people of London. From 1387 to 1390 he was one of the leaders of the party opposed to Richard II (q.v.), being one of the five lords appellants who in 1387 led an army against London and forced Richard to dismiss his unpopular favorites. In 1390-91 he was engaged on a crusading expedition in Lithuania with the Teutonic Knights. In 1392 he started on a second expedition to Lithuania, but soon changed his purpose and made a pilgrimage to Jerusalem. After his return he joined the King's party and was made Duke of Hereford in 1397. In 1398, as a result of the hostility between Henry and the Duke of Norfolk, the former was banished from England for six years, while his rival was exiled for life. Henry's banishment served to increase his popularity with the people of London, who chose to regard him as a martyr. In 1399 his father died, and Richard, in spite of his promise, confiscated the estates which should have descended to Henry. The latter, profiting by the King's absence in Ireland, landed in England in July, 1399. He was eagerly welcomed by all the discontented and met with no effectual opposition. Richard on his return from Ireland was deserted by his followers and soon fell into Henry's hands. The King agreed to abdicate, his resignation was accepted by Parliament on Sept. 30, 1399, and Henry was chosen King, inaugurating the line of Lancaster. As he was not the nearest heir in line of descent, and as he did not claim England by right of conquest, he owed his title to Parliament, and he is sometimes called the first constitutional monarch. The first half of his reign was filled with wars. At his accession he showed himself lenient to all his former enemies, merely taking from them the dignities which they had won at his expense. An at-

tempt at rebellion in January, 1400, by the lords whom he had degraded was easily put down. Most of the rebels were put to death, and Richard II died soon after, possibly murdered. In the same year the Welsh revolted under Owen Glendower (q.v.). The Scots, who also began war, were defeated at Homildon Hill (q.v.) in 1402. The French gave aid both to the Scots and Welsh and harried the English coast, but accomplished little, on account of their internal dissensions. In 1403 the Percy family, dissatisfied with the rewards bestowed upon them by the new King, rose in rebellion, but were overthrown in the battle of Shrewsbury, in which Harry Percy, the famous Hotspur, fell. In 1405 James I, heir to the Scottish throne, was captured while on his way to France, and this brought peace with Scotland. After this date the wars were less dangerous, but Henry suffered from an illness which gradually sapped his strength. Another rebellion was put down in 1408, and at the same time a number of successes were gained over the Welsh. Henry died March 20, 1413. He was brave, naturally merciful, devout, and able, but subject to fits of passion. He recognized the authority of Parliament and acted as a constitutional monarch. His reign was stained by enactments against the Lollards and by persecutions. He was a patron of Gower, Chaucer, and Christine de Pisan. He had four sons and two daughters by his first wife. In 1403 he married Joan of Brittany as a matter of diplomacy, but he gained nothing by this marriage. For the best modern authorities on his reign, consult: Stubbs, *Constitutional History of England*, vol. iii (Oxford, 1895); Oman, *Political History of England, 1377-1485* (London, 1906); but, above all, Wylie, *History of Henry IV* (4 vols., ib., 1884-98).

HENRY V (1387-1422). King of England from 1413 to 1422. He was the eldest son of Henry IV and of Mary Bohun and was born Aug. 9, 1387, at Monmouth. In 1399, on the accession of his father to the throne, he became Earl of Chester, Duke of Cornwall, Prince of Wales, Duke of Aquitaine, and Duke of Lancaster. In his youth he had acquired great military distinction in operations against Hotspur and Glendower (q.v.), and in 1410 and 1411 he governed in the name of his father, who was ill. Late in 1411 he fell into disfavor with his father and was deprived of his power. At his father's death, March 20, 1413, he became King. He liberated the young Earl of March from the confinement in which Henry IV had placed him and restored the son of Hotspur to the lands and honors which his father had lost by rebellion. He followed in the footsteps of his father in persecuting the Lollards with fire and halter, the celebrated leader of the Lollards, Sir John Oldcastle (q.v.), being put to death in 1417. The great event of his reign was the attempted conquest of France, in which he virtually succeeded. In his first campaign he besieged and took the town of Harfleur and gained the battle of Agincourt (q.v.), Oct. 25, 1415, against enormous odds. Two years after he again invaded France and made Normandy once more subject to the English crown. Rouen was captured in January, 1419, after a long siege, an incapable King and civil discord in France aiding him greatly. On May 21, 1420, a treaty was concluded at Troyes between Henry and the French King, Charles VI, by which Henry

obtained the regency of France, the eldest daughter of the French King for his wife, and the succession to the French crown on the death of the King. He was married to Catharine of France, on June 2, 1420. He had hardly returned to England when the defeat at Beaugé of his brother, the Duke of Clarence, whom he had left as Governor of Normandy, rekindled the hopes of the French, who supported the Dauphin Charles in his repudiation of the Treaty of Troyes, to which he had not agreed. Henry returned to France for a third campaign, and his wonted success in arms was following him when he was seized with illness, and died, on Aug. 31, 1422, at Vincennes, at the age of 35 years, leaving an infant son, Henry VI, to succeed him. His private life was exemplary; as a king, he was noted for his strict justice; in war he was one of the ablest generals of his time. Consult: Stubbs, *Constitutional History of England* (Oxford, 1895); Wylie, *History of Henry IV*, vol. iii (new ed., New York, 1914); Kingsford, *Henry V* (Oxford, 1911); Oman, *Political History of England, 1377-1485* (London, 1906); Vickers, *England in the Later Middle Ages* (New York, 1914).

HENRY VI (1421-71). King of England from 1422 to 1461. He was the only child of Henry V and Catharine of France and was born at Windsor, Dec. 6, 1421. He was not quite nine months old at his father's death, when he became King of England, and a few weeks later, on the death of Charles VI of France, he was also proclaimed King of that country. His claim to France was disputed by Charles VII; but the latter was too indolent to make any serious attempt to conquer the kingdom. The Duke of Bedford, brother of Henry V, who was Regent of France, was successful in holding the country for Henry VI until 1429. Then Joan of Arc (q.v.), by her heroism, aroused the valor of the French nation, defeated the English at Orléans, and led Charles VII to Rheims to be crowned. The Maid of Orléans fell into the hands of the English the following year and was burned in 1431, and a few months later Bedford was able to have Henry crowned at Paris. He had already received the English crown at Westminster, on Nov. 6, 1429. But France gradually passed out of the control of the English, as the French united against foreign rule. On Bedford's death, in 1435, the Duke of Burgundy broke off his alliance with the English and joined Charles VII. From this time the English lost ground steadily, and by the end of 1451 Calais was the only English possession in France. During Henry's minority there was no opposition to the King in England; but his marriage with Margaret of Anjou, in 1445, was unpopular, as the bride brought no dowry, and one of the conditions of the marriage was the surrender of some English territory in France. Henry's own weakness, the lack of success in France, and economic troubles at home aroused bitter opposition; for Henry was virtuous and amiable, but unequal to the task of ruling. When he was 32 years old, his weak intellect gave way, and he became insane. At times he recovered his reason, but was always subject to a relapse into insanity.

As the wars ceased in France, disorderly bands of soldiers returned home and sought service with the powerful nobles, who maintained great armies of followers, in defiance of the law. The King was too weak to enforce order in his king-

dom, and many illegal usurpations of property by the great nobles went unpunished. The system of inclosing lands for pasture threw many agricultural laborers out of employment. The result was a rising on the part of the people. In 1450 the Duke of Suffolk, who had negotiated the marriage with Margaret and was the King's favorite Minister, was impeached by the Commons and condemned to banishment, but was murdered on his way to the Continent. Not content with the fall of Suffolk, the men of Kent, led by Jack Cade (q.v.), rose against his appointees, who still held the chief offices. They demanded a redress of grievances and that the Duke of York should be made the head of the government. The latter was a descendant of Lionel, the third son of Edward III, and consequently by hereditary right his title to the crown was superior to that of Henry VI, who was descended from Edward's fourth son. From this time York was supported by the discontented people and generally opposed by the nobles. During two periods while the King was temporarily insane York was made Protector, but each time the King recovered his reason York was in danger of destruction. In 1455 the battle of St. Albans was fought between the King's favorite, Somerset, and the Duke of York, in which Henry was taken prisoner. This is generally called the first battle in the War of the Roses (q.v.). After some desultory strife Henry VI was again captured by the Yorkists in the battle of Northampton, in 1460, and York asserted his claim to the throne. The lords arranged a compromise that Henry should keep the crown, but that York should be acknowledged as his successor. This arrangement only led to a long war, because Margaret was enraged that her son should be deprived of the succession to the crown. She sought aid in the north, raised an army of 18,000 wild warriors, and won the battle of Wakefield, in 1460, where York was slain. But the depredations and cruelties of her rough followers alarmed the people in the south, who rallied to Edward, Earl of March, the son of York. The latter, by his victory at Towton (March, 1461), gained the throne, and was crowned as Edward IV on June 20, 1461. Margaret and Henry escaped, and there were several engagements before 1465, when Henry was taken prisoner. Margaret was implacable and finally obtained the aid of the Earl of Warwick (see WARWICK, RICHARD NEVILLE, EARL OF), who in 1470 drove Edward out of England. Henry, although an imbecile, was reinstated as King; but Edward returned in the same year. Henry was captured and died in 1471. There is little doubt that he was murdered by order of Edward. Consult: Gairdner, *Paston Letters* (London, 1872-75); Stubbs, *Constitutional History of England*, vol. iii (Oxford, 1895); Oman, *Political History of England, 1377-1485* (London, 1906); Vickers, *England in the Later Middle Ages* (New York, 1914).

HENRY VII (1457-1509). King of England from 1485 to 1509. He was born Jan. 28, 1457, at Pembroke Castle, the son of Edmund Tudor, Earl of Richmond, and Margaret, granddaughter of John of Gaunt, founder of the Lancastrian house. From John Henry derived his claim to the crown. Henry's grandfather was Owen Tudor, a Welsh knight, who married Catharine, widow of Henry V. In 1471, on the death of Henry VI, and Edward, Prince of Wales, Henry

became the head of the Lancastrian house. During the reigns of Edward IV and Richard III, the last Yorkist kings, he took refuge in Brittany, until the crimes of Richard III, who murdered his own nephews, "the Princes of the Tower" (q.v.), alienated the Yorkist nobility and drove them to accept Henry as Richard's only possible rival. Henry landed at Milford Haven in 1485, and in the battle of Bosworth, August 22, Richard was defeated and slain. The marriage of Henry with Elizabeth, the Yorkist heiress, cemented the union of the two parties; but Henry was crowned before the marriage and claimed the title of his own right, the first of the Tudor kings.

The numerous disturbances during the first half of Henry's reign were due on the whole rather to the instigation of remnants of the Yorkist faction and its foreign supporters than to the disaffection of his subjects at home. The rising of Lovell (1486), the invasions of the impostors Simnel (1487) and Warbeck (1495 and 1496-97), found little favor among the English people and were easily suppressed, but they had important consequences. In order to prevent the Scottish King from taking further part in these intrigues, a marriage was arranged between Margaret, Henry's eldest daughter, and James IV of Scotland, which led to the accession of a new ruling house in England 100 years later. In order to guard himself from further invasions from Ireland, a stronghold of the Yorkist party, whence danger usually threatened, Henry was forced to resume the fateful policy of English control which had been abandoned during the Wars of the Roses. In 1494 it was provided that English laws then in force should apply to Ireland. The celebrated Poynings's Law of the same year provides for the supremacy of the English Council over Irish legislation. Foreign affairs occupied much of Henry's attention, since the enemies of France, especially Maximilian of Austria and Ferdinand the Catholic, were anxious for Henry's coöperation; but he was too wily to be led into wars from which they would profit more than he. The negotiations led, however, to the marriage, in 1501, of his eldest son, Arthur, to Catharine, the daughter of Ferdinand and Isabella, and after Arthur's death in 1502 to that prince's brother, Henry VIII, in 1509.

During Henry's reign the royal power rapidly increased. Livery and maintenance (q.v.) were suppressed. The Star Chamber (q.v.) offered an effective means of curbing the turbulent nobles. Henry was avaricious, and the wealthy groaned at the heavy taxes; but Parliament was compliant to his will. His power was not based entirely upon force, for he had no standing army, but on the support of the middle classes, to whom his reign brought security and prosperity after the disorders of the Wars of the Roses. He died at Richmond, April 21, 1509. The discovery of the North American continent by John Cabot, in 1497, was but one of the results of Henry's efforts to encourage commerce.

The best biographical accounts are Gairdner, *Henry VII* (London, 1889), in "Twelve English Statesmen Series," and two lectures by Bishop Stubbs in *Lectures* (Oxford, 1887). Five volumes of sources have been printed in the "Rolls Series," under various titles. The admirable French *Histoire générale*, by Lavisse and Rambaud, vol. iv (Paris, 1894), has a chapter on Henry by M. Bémont, somewhat biographical in

character, with a bibliography. Bacon's *Henry VII* is still of interest. Consult: Lingard, *History of England*, vol. iv (London, 1854); Green, *History of the English People*, vol. ii (New York, 1879); Hallam, *Constitutional History of England*, vol. i (London, 1855); Traill (ed.), *Social England*, vol. ii (New York, 1894), with bibliography; A. F. Pollard, *The Reign of Henry VII* (3 vols., London, 1913-14); W. M. Temperley, *Henry VII* (Boston, 1914).

HENRY VIII (1491-1547). King of England from 1509 to 1547. He was the second son of Henry VII and Elizabeth of York and was born at Greenwich, June 28, 1491. He became heir apparent to the English crown on the death of his brother Arthur, in 1502. In the following year he was betrothed to Catharine of Aragon, Arthur's widow, a papal dispensation having been obtained from Julius II on account of their relationship. The marriage was to have taken place on the completion of Henry's fourteenth year; but Henry VII was playing a wily game of diplomacy with Ferdinand, Catharine's father, and postponed the wedding on various pretexts in order to extort concessions. He even caused his son to protest that the whole arrangement was against his will. On April 21, 1509, Henry succeeded to the crown, at the age of 18. On June 11 he married Catharine, and they were crowned together on June 24. Although she was six years his senior, their marriage was for many years a happy one. For some time after his accession Henry gave himself up to festivities and sports. He was described in 1519 by Giustiniani, the Venetian Ambassador, as the handsomest and best-dressed prince in Europe. "He is very accomplished, a good musician, composes well, is a most capital horseman, a fine joustier, speaks good French, Latin, and Spanish, is very religious, hears three masses daily when he hunts, and sometimes five on other days. . . . He is very fond of hunting, and never takes his diversion without tiring eight or ten horses, which he causes to be stationed beforehand along the line of country he means to take, and when one is tired he mounts another, and before he gets home they are all exhausted." On account of his handsome person, his hearty, generous manners, his fondness for the services of the Church, and his appreciation of the new learning, Henry was a favorite with all classes of the English people. He chose his ministers with rare sagacity and, in spite of his gayety, knew what was going on in his administration. He had a violent temper, and no monarch ever held his servants under firmer control. Until 1529 affairs were in the hands of Wolsey (q.v.), whom Henry had raised from a humble station to be Archbishop of York (1514) and Chancellor (1515) and caused to be appointed Cardinal (1515) and *legate a latere* (1518). Wolsey had thus in his hands almost supreme power over church and state, and he rivaled the King in outward splendor; yet no one was in doubt as to who was the real master. Wolsey's precarious tenure depended upon his ability to fulfill, and if possible to anticipate, his young master's wishes.

During approximately the first half of Henry's reign, before the matter of the King's divorce became urgent, his attention was occupied with foreign affairs. For some time subsequent to 1519 Europe was divided into two hostile camps by the rivalry between Charles V and Francis I, and Henry could be depended upon in the long

run to take the side of Charles, not so much on account of their relationship (he had married Charles's aunt) as on account of the close commercial relations between England and Charles's possessions in the Low Countries and because opposition to France was still popular in England. For these reasons Henry always opposed Francis when it came to actual warfare, though he frequently changed sides in the diplomatic struggle. Even before the accession of Charles V and Francis I, the relations of their predecessors had been much the same, and in 1511 Henry had been drawn into the Holy League between the papacy, Spain, Austria, and Venice against France. Early in 1512 Henry had sent an abortive expedition to regain Guienne. In the following year he took part in person in the triumphant campaign in northern France. The French were defeated at Guinegate August 16, in what is known as "the Battle of the Spurs," from the rapidity of the French flight; Théroutanne surrendered August 24, and Tournay September 25. James IV of Scotland taking advantage of Henry's employment elsewhere, invaded England, and was defeated and slain at Flodden, Sept. 9, 1513. Henry fully intended to renew the campaign the next year, but when he learned that both Ferdinand of Spain and Maximilian of Germany had deserted him, he secretly made peace, which was cemented by the marriage of his sister Mary with Louis XII. From this time until the outbreak of the first war between Francis and Charles (1521) Wolsey was free to carry out with tolerable success his favorite policy of mediation between the two rivals. There were many interviews, among others the famous "Field of the Cloth of Gold" (1520), and much treachery on all sides; but in the end Wolsey's peace policy had to give way before Henry's warlike spirit. There were campaigns against France in 1522 and 1523; but they had no other result than an increased taxation at home, for which Wolsey was popularly held accountable. In 1525 Francis was not only defeated at Pavia, but taken prisoner, and Henry thought that the time had come to recover the crown of France. With this purpose in view he demanded an immediate loan from his subjects in proportion to their incomes, but at an extortionate rate that riots broke out and the loan had to be recalled. Henry, as was his wont, meanly threw the odium upon Wolsey, who was in no wise responsible. The failure of the loan made peace with France necessary, which was signed in 1525. In the following year Francis regained his freedom upon agreeing to Charles' extortionate demands; but he held himself no bound by forced concessions, and war broke out anew (1527-29), in which he found an ally in Pope Clement VII. Henry took no direct part in this war, but he was anxious to join the French and papal side, for the reason that Charles was becoming too powerful and insolent and that he was meditating the divorce of Catharine of Aragon, to which the consent of the Pope was at that time thought necessary.

For some years Henry had been growing tired of Catharine. Her only surviving child was his daughter Mary, and since no queen had ever sat upon the throne of England, it might reasonably be doubted whether the succession was safe without a male heir. Besides, since 1522, there had been at court the young and sprightly Iris beauty, Anne Boleyn, with whom the King had become enamored. Henry's professed motive

however, was conscientious scruples concerning the validity of his marriage with his brother Arthur's widow, notwithstanding the Pope's dispensation, and in 1527 he asked Clement VII not merely to grant him a divorce, but to declare that the dispensation of Julius II was invalid, and that the marriage with Catharine had been void from the beginning. Apart from other considerations, Clement VII could hardly be expected to impair his own authority by such a ruling; nor was the time propitious for such a request, for in the year in which it was made the Imperial troops had sacked Rome, and Clement VII was at the mercy of Charles V. The most that Henry could obtain was a legatine court, composed of Wolsey and Campeggio; but the Pope's purpose in granting it may have been only delay. Campeggio could neither induce Henry to change his mind nor Catharine to yield, and in 1529 Clement revoked the case to Rome, where Henry knew that it would be useless to press the matter further, especially as Charles and Clement were now in alliance. The result was the fall of Wolsey, and the beginning of momentous changes in the relations between the state and church in England. Henry probably little realized the importance of the steps which he took in order to procure a male heir to the throne. He certainly did not intend to introduce Protestantism, for which he had an aversion. He was no mean theologian, and in 1521 he had written a book against Luther entitled *Assertio Septem Sacramentorum*, which won for him, by the irony of fate, the papal title "defender of the faith," which English sovereigns have borne to the present day. In 1530 Henry was occupied with Cranmer's suggestion that the favorable opinion of the learned doctors of the universities as to the nullity of the marriage would leave him free to marry again without the Pope's consent. Bribery and cajolery were freely used with considerable success; but in 1531 Henry proceeded to more vigorous measures. Upon the suggestion of Thomas Cromwell, an adventurer, who rose to influence soon after Wolsey's fall, he conceived the plan of seizing the papal authority and revenue in England, thereby not only securing the divorce, but vastly increasing the resources and power of the crown. Henry accused the clergy of having violated the Statute of Præmunire (q.v.) in accepting Wolsey's legatine authority, although they would have met with swift punishment if they had presumed to act otherwise, and although Henry himself had called in the legate Campeggio a short time before. Large numbers of the laity were also equally involved; but this was merely a violent and unscrupulous method of securing the clergy at home before proceeding against the authority of the Pope. Henry's complete success and the very moderate resistance of the clergy show how times had changed since the days of Henry II and Thomas of Canterbury. The Pope had never fully regained his prestige after the movement of Wiclif; and the English clergy were not only wealthy and therefore timid, but since Wolsey as Royal Chancellor and papal legate had practically united supreme power in state and church, they had grown compliant to the royal will. The Convocation of Canterbury offered a gift of £100,000 to be freed from the penalties of præmunire, which involved the confiscation of all their property. Henry demanded in addition that he be recognized as the supreme head of the Church of England, which after some

resistance they accepted with the vague qualification, "so far as is permitted by the law of Christ." The Convocation of York soon after bought its pardon on the same condition and the payment of £18,000. Henry found support in these measures in Parliament, whose elections he practically controlled, and whose members were either lawyers or country squires, with little affection for the Church. In 1532 the clergy submitted its entire body of canons to the King's examination, and renounced the right to make new canons without royal permission, thus putting an end forever to the freedom of the English church. In 1533 Henry made retreat impossible by secretly marrying Anne Boleyn without a divorce. In the same year he made Cranmer, an able but compliant and vacillating churchman, Archbishop of Canterbury, who on May 23 decided that Henry's marriage with Catharine was void, and on May 28 that his secret marriage with Anne was lawful. About a year after, Clement decided in favor of Catharine, but not until Henry, foreseeing the result, had all but severed the connection between the English church and Rome. In 1534 Parliament changed the provisional Act of Annates of 1532 into an unconditional one, giving the King the annates or first fruits which were formerly paid to the Pope. It also provided for the appointment of bishops without reference to papal authority and abolished appeals to Rome. Henceforth the Pope was merely "the Bishop of Rome," with no more authority in England than any other foreign bishop.

The new royal supremacy found its first expression in three acts which, taken together, assumed an intolerably tyrannical character. The first act of succession of 1533 not only fixed the inheritance to the crown in the issue of Anne Boleyn, and declared that the marriage with Catharine was invalid from the beginning, but required all subjects to take oath affirming their full acceptance of the contents of the act, which no Catholic could conscientiously do; and it further declared that any one who refused should be guilty of high treason. The act of supremacy and the treason act of the following year confirmed the royal title "supreme head of the Church of England," and declared that any one who should deprive the King of his title should be guilty of high treason. The King thus tried not only to rule over men's actions, but over their consciences. Numerous victims met a traitor's death for refusing to swear that Catharine's marriage was unlawful, though otherwise they were willing to accept the new succession. With incredible callousness Henry sent to the block Sir Thomas More, his former friend and boon companion, one of the ornaments of the age, and Fisher, whom the Pope shortly before had made Cardinal. Many friars were burned merely for refusing to take the oath on conscientious grounds. Some of them had spoken against the King's second marriage, but others had not. In 1536 Anne, on little or no evidence, was convicted of many and monstrous offenses and was beheaded. Ten days later Henry married Jane Seymour, and a new act of succession made it treasonable to affirm what it was formerly treasonable to deny.

The resistance of the friars no doubt helped to call the attention of Cromwell, who had been made vicar-general in ecclesiastical matters in 1535, to the rich booty to be acquired through the dissolution of the monasteries, at that time

widely established throughout England. He ventured at first to despoil only the lesser houses. A royal visitation of the year 1535 made the convenient discovery that monasteries "where the congregation of such religious persons is under the number of 12 persons" were the seats of "manifest sin, vicious, carnal, and abominable living," while those with more than 12 persons were not. Parliament thereupon (1536) dissolved the smaller houses and gave their property to the King. The Catholic rising in the northern and more conservative districts in 1536, known as the "Pilgrimage of Grace," involved some of the remaining abbots of that region, and this was a signal for the dissolution of the greater monasteries. Those who were implicated in the revolt were executed for treason, and the others were gradually frightened into surrendering their authority and property into the hands of the King, "of their own free and voluntary minds, good wills and assents, without constraint, coercion, or compulsion of any manner of person or persons," as the Parliamentary Act of 1539 puts it. Henry used the enormous spoils of the monasteries partly for religious objects, partly for military purposes; but much was granted to royal favorites, and many prominent families in England at the present day derive their fortunes from this source. One of the unexpected consequences of the dissolution was the formation of a considerable party keenly interested in maintaining the religious innovations.

It was not, however, Henry's first intention to introduce religious innovations, other than the royal supremacy. If More and Fisher were beheaded for denying the royal supremacy, John Frith was burned for denying the doctrine of transubstantiation. Yet preachers with Protestant tendencies were appearing and criticizing the old order of things with great asperity. To prevent these disturbances, the Ten Articles were promulgated in 1536 by royal order, containing a creed which in the main held to the old order, yet passed over in silence or tried to explain some of the controverted points. In the same year the Bible was translated with royal sanction, though Henry apparently took no great interest in it. The new movement was sure to grow. Its intellectual leader was Cranmer, who was himself under the influence of Ridley. Cranmer and Ridley were slowly changing their views in the direction of Protestantism. Cromwell also favored Protestantism, for political reasons. In 1538 there was much smashing of images and spoliation of tombs, until Henry took alarm. In 1539 he issued, with the consent of Parliament, the reactionary Six Articles, affirming the principal controverted Catholic dogmas. Englishmen found it as dangerous to be too Protestant as too Catholic, and the discreet conformed to Henry's somewhat shifting views. In 1544 Cranmer wrote his celebrated Litany and ordered certain parts of the service to be said in English; but further changes were cut short by Henry's death.

In the meantime Cromwell had come to grief through his arrangement of the marriage of Henry to Anne of Cleves, in order to form a connection with the Protestant princes of Germany. When Anne reached England, she was found to be far from handsome, and Henry's resentment was great. This provided an excuse for immediate action against Cromwell, of whom Henry had grown tired because of the failure of his

foreign policy and because of his strong leaning towards Protestantism. He was executed July 28, 1540, as a heretic. Ten days after Cromwell's execution Henry married Catharine Howard, Anne having been divorced shortly before; but she was soon found to have been unfaithful, both before and after her marriage, and was beheaded. In 1543 Henry married his sixth wife, Catharine Parr, who survived him.

Although he had already rid himself of the great wealth his father left him, had grievously oppressed his people with heavy taxes, had been twice absolved by Parliament from repaying his loans, had levied illegal benevolences, and had debased the coinage, his last years were again occupied with foreign enterprises. He tried to establish his authority in Ireland by winning over the native chiefs, stripping the Irish monasteries for their benefit. From 1542 to 1546 he was at war with Scotland and France. The Scots were defeated at Solway Moss in 1542, and James V died soon afterward. Henry took Boulogne in 1544 and made peace two years later. He died Jan. 28, 1547. By Act of Parliament, in 1544, the succession had been given to the offspring of Jane Seymour, Catharine of Aragon, and Anne Boleyn—respectively Edward, Mary, and Elizabeth, who succeeded in this order and died without issue.

Bibliography. Cavendish, *The Life of Cardinal Wolsey* (London, 1852); *Catharine of Aragon and the Sources of the English Reformation*, by Du Boys, edited from the French by Charlotte Yonge (ib., 1881); Brewer, *The Reign of Henry VIII from his Accession to the Death of Wolsey* (ib., 1884); Creighton, *Cardinal Wolsey* (ib., 1888); Froude, *The Divorce of Catharine of Aragon* (New York, 1891); Gairdner, *The English Church in the Sixteenth Century, from the Accession of Henry VIII to the Death of Mary* (London, 1902); Merriam, *Life and Letters of Thomas Cromwell* (Oxford, 1902); Hume, *The Wives of Henry VIII and the Parts they Played in History* (New York, 1905); Pollard, *Henry VIII* (new ed., New York, 1913); Fisher, *The History of England from the Accession of Henry VII to the Death of Henry VIII* (London, 1906); F. A. Gasquet, *Henry VIII and the English Monasteries* (New York, 1906); Mumby, *The Youth of Henry VIII* (Boston, 1913); Childre Pemberton, *Elizabeth Blount and Henry VIII* (London, 1913). The original material for the study of Henry VIII's reign is mostly in *Letters and Papers, Foreign and Domestic, of the Reign of Henry VIII*, edited by Brewer, Gairdner, and Brodie (21 vols., London, 1862-1910). Hall, *Henry VIII*, edited by Whibley (ib., 1904), is a contemporary chronicle. Consult also Green's *History of the English People* (4 vols., New York, 1900).

HENRY I (1008-60). King of France from 1031 to 1060. He was the son of Robert I and a grandson of Hugh Capet. The first years of his reign were disturbed by a rebellion participated in by his mother, Constance of Toulouse. After her death, in 1034, he put the rebellion down; but another began almost immediately and was put down only in 1039. In the disorders which followed the death of Robert the Devil, Duke of Normandy, in 1035, Henry assisted William the Bastard, the illegitimate son and successor of Robert (later known as William the Conqueror), in establishing his authority over the rebellious Norman nobles, participating in the battle of Val-ès-dunes in 1047. Subsequently

Henry grew jealous of the power of the Norman Duke. Leaguings himself with the Count of Anjou and calling his brother Eudes into the field, he invaded Normandy from Evreux in 1054. Eudes was defeated at Mortemer, but Henry continued the war till 1058, when he had to admit defeat and make concessions to William. In 1059 he caused his eldest son, Philip, to be crowned as joint King. Henry died Aug. 4, 1060. He was an active prince, who spent a large part of his time in the field, upholding the royal authority against the feudal nobles. His first wife, Maud or Mathilda, niece of Henry III of Germany, died childless; his second wife, Anne, daughter of Jaroslaff, Grand Duke of Kiev, bore him three sons—Philip, his successor; Robert, who died in childhood; and Hugh, Count of Vermandois. Consult: Soehnée, *Etude sur la vie et le règne de Henri I* (Paris, 1891); id., *Catalogue des actes de Henri I* (ib., 1907); Lavisse, *Histoire de France*, vol. ii, part ii (ib., 1901).

HENRY II (1519–59). King of France from 1547 to 1559. He was born March 31, 1519, being the second of three sons of Francis I by his first wife, Claude. From 1526 to 1529 Prince Henry was a hostage in Spain, together with his brother, the Dauphin Francis. In 1533 he married Catharine de' Medici, and in 1536 the death of the Dauphin Francis made him the heir apparent to the throne. The same year he became the lover of the celebrated Diana of Poitiers, a woman several years his senior, but of attractive mind and strong will. In 1547 Henry succeeded his father, Francis I, and at once submitted himself to the influence of his mistress and of Anne de Montmorency, Constable of France, though the Guises also enjoyed a large share of the royal favor. A revolt in Guienne, where the people had risen against the *gabelours*, or collectors of the salt duty, was speedily put down by Montmorency. In 1550 Boulogne, which had been taken by the English during the wars of Henry VIII, was recovered by the French, and in a second war, which began in 1557, the English lost Calais and Guines, their last possessions in France (1558). Though a strong Catholic and a persecutor of the Huguenots, Henry made treaties of alliance with the German Protestants, led an army of 38,000 men to aid Maurice of Saxony against the Emperor, and made himself master of the bishoprics of Toul and Verdun, while Montmorency seized Metz by treachery (1552). After the abdication of Charles V (1555–56) Henry embraced the opportunity of attacking the Netherlands and Italy before Philip II could consolidate his newly acquired possessions; but the results of this step were disastrous to France at every point. In Italy the attack on Naples, made by Guise at the head of 20,000 men, utterly failed; while in the Low Countries the French under Montmorency sustained a total defeat, Aug. 10, 1557, at Saint-Quentin and were forced to abandon the town to the Spaniards. This was followed by the defeat of De Thermes at Gravelines in 1558, which with other causes led to the Treaty of Cateau-Cambrésis, April 2–3, 1559. On June 29 Henry II was mortally wounded in a tournament by Count Montgomery, the captain of his Scottish Guards, and died July 10, 1559. He is represented by historians as a bold and handsome man, but cold and indolent. His Queen, Catharine de' Medici, bore him 10 children, of whom three lived to be kings of France. He was succeeded by his eldest son, who became Francis II. Consult the con-

temporary memoirs of Monthieu, Tavannes, Vieilleville, Villars, and Brantôme; also, Barre-Duparcq, *Histoire de Henri II* (Paris, 1887); Ranke, *Civil Wars and Monarchy in France in the Sixteenth and Seventeenth Centuries* (trans., London, 1852–61); H. N. Williams, *Henri II: His Court and Times* (New York, 1911). See also FRANCE; and consult the authorities referred to there.

HENRY III (1551–89). King of France from 1574 to 1589. He was the third son of Henry II and Catharine de' Medici and was the last of the house of Valois. He was born at Fontainebleau, Sept. 19, 1551, and in his youth bore the title of Duke of Anjou. At the age of 16 he was made a lieutenant general and placed in nominal command of the armies of France, though the real direction of operations was in the hands of Marshal de Tavannes. Henry had a part in the victories over the Huguenots at Jarnac and Moncontour in 1569 and was active in abetting the Massacre of St. Bartholomew. He was elected King of Poland in 1573, but upon receiving news of the death of his brother, Charles IX, in the following year, he fled from Cracow to make certain his succession in France. As King, he continued the war against the Huguenots; but the union of the party of his brother, the Duke of Alençon, with the Huguenots wrung from the alarmed King the Peace of Beaulieu (or of Monsieur) in 1576, confirmed by the Edict of Poitiers or Bergerac in 1577. This peace granted so many privileges to the Huguenots that it exasperated the Catholic party and led to the formation of the Holy League, the avowed object of which was to maintain the supremacy of Catholicism and the secret purpose to secure the reversion of the throne to the Guises. His life was marked by alternate outbursts of licentiousness and moods of gloomy fanaticism. The affection he lavished upon his effeminate favorites, or *mignons*, as they were called, aroused the disgust of the nation. This caused the popularity of Henry of Guise to be strengthened. A renewed war with the Huguenots (1579–80) was concluded by the Peace of Fleix, a renewal of the terms of that of Bergerac. The strength of the League grew rapidly, aided by the Duke of Guise. By the death of the Duke of Anjou (formerly of Alençon), Henry of Navarre became heir to the throne (1584); but the Catholics would not accept him, and Henry III, after an attempt to come to an understanding with his cousin of Navarre, issued the Edict of Nemours (1585), repealing all privileges granted the Huguenots. The so-called War of the Three Henrys then broke out. In 1587 the Huguenots under Henry of Navarre triumphed at Coutras. King Henry found that Henry of Guise, through his commanding position, was becoming master of the kingdom. On May 12, 1588, the so-called Day of the Barricades, the inhabitants of Paris rose against the royal forces and were quelled only by the interposition of Guise. The King fled to Blois, convoked the Estates and summoned Guise to a private audience. Guise was assassinated in the King's cabinet by the guards known as the "Forty-five" (Dec. 23, 1588); and his brother, the Cardinal de Lorraine, was put to death on the following day. This double assassination aroused the hatred of Catholic France. The doctors of the Sorbonne declared the people to be relieved of the duty of obedience to the King, and the heads of the League dissolved the Es-

tates. Henry was distracted by the difficulties of his position and threw himself under the protection of Henry of Navarre. The two kings advanced at the head of an army of 40,000 Huguenots on Paris, which would probably have had to capitulate had not Henry III been assassinated, Aug. 1, 1589, by a fanatical young Dominican, named Jacques Clément. The murderer was slain on the spot by the royal guard, and the King died on the following day, after having declared Henry of Navarre his successor. Although incapable of governing, he was a patron of art and letters and should be ranked with Francis I in this particular.

Consult the memoirs of Tavannes, Vieilleville, Castelnau, Brantôme, and De Thou; also Freer, *Henry III: His Court and Times* (3 vols., London, 1858); Jackson, *The Last of the Valois and the Accession of Henry of Navarre* (2 vols., ib., 1888); Ranke, *Civil Wars and Monarchy in France in the Sixteenth and Seventeenth Centuries* (2 vols., Eng. trans., ib., 1852); E. Armstrong, *The French Wars of Religion, 1559-98* (ib., 1892); De Noailles, *Henri de Valois et la Pologne* (3 vols., Paris, 1867); De la Barre-Duparcq, *Histoire de Henri III* (ib., 1882); Robiquet, *Paris et la Ligue sous Henri III* (ib., 1886); Nolhac and Salerti, *Il viaggio in Italia di Enrico III, re di Francia* (Turin, 1890); J. Nouaillac, *Villeroi, secrétaire d'état de Charles IX, Henri III et Henri IV* (Paris, 1909). See FRANCE; HUGUENOTS.

HENRY IV (1553-1610). King of France from 1589 to 1610, sometimes called the Great. He was born in the castle of Pau, Béarn, Dec. 14, 1553, being the third son of Antoine de Bourbon and Jeanne d'Albret, daughter and heiress of Henry II, King of Navarre and Béarn, and allied through his father with the French royal family. In 1555 his mother became Queen of Navarre and gave her husband the title of King. Henry himself was known as Prince of Viane. His father's death, in 1562, placed him under the sole control of his mother, who was a zealous Calvinist and was careful to select learned men holding her own tenets for his instructors. Upon the outbreak of the third Civil War in France the young prince and his intrepid mother joined the Huguenots at La Rochelle, and after the death of the Prince of Condé at Jarnac (March 13, 1569) Henry was proclaimed by the voice of the army chief of the Protestant cause. On account of his extreme youth, however, the actual command was vested in Coligny (q.v.). Notwithstanding the defeats which the Huguenots had experienced in this campaign, the Peace of Saint-Germain-en-Laye (Aug. 8, 1570) was apparently of great advantage to them and was speedily followed by a contract of marriage between Henry of Navarre and Margaret of Valois, the sister of Charles IX. Jeanne d'Albret died suddenly a few months later (June 9, 1572), and the prospective bridegroom became King of Navarre, under the title of Henry III. After much opposition on the part of both Catholics and Protestants, the marriage with Margaret of Valois was celebrated with great pomp, Aug. 18, 1572, followed within a week by the Massacre of St. Bartholomew. It had been originally intended that Henry should share the fate of his friends and coreligionists, but his life was spared on condition of his professing himself a Catholic. For more than three years he remained at the French court, virtually a prisoner and contin-

ually plotting and seeking to escape; but at length, in February, 1576, he contrived to elude the vigilance of his guardians and made his way to the camp of the Huguenots in Gascony, where he repudiated his enforced conversion and resumed the command of the army. In the Peace of Beaulieu, concluded May 6, 1576, the Huguenots obtained several distinct advantages.

The death of the Duke of Anjou (late Alençon) in 1584 made Henry presumptive heir to the crown. Some years previous to this the Catholic League had been formed, the secret purpose of which was the support of the Guise pretensions to the throne. The War of the Three Henrys (Henry III of France, Henry of Navarre, and Henry of Guise) was terminated by the Protestant victory of Coutras, Oct. 20, 1587. In 1588 Henry III of France, hating and fearing the powerful Guises, who had virtually made themselves his masters, caused the Duke of Guise and the Cardinal de Lorraine to be murdered, and in the following year came to an understanding with Henry of Navarre. The two now proceeded to lay siege to Paris, August, 1589. The assassination of Henry III by Clément made Henry of Navarre, as the nearest lineal male descendant of the royal house of France, rightful King of France, the house of Bourbon succeeding to that of Valois. As a Protestant, he had been excommunicated by Sixtus V in 1585 and declared incapable of succeeding to the French crown. His religion, moreover, made him obnoxious to the greater part of the nation, and he found in addition that the dukes of Lorraine and Savoy, and Philip II of Spain, were prepared, each on his own account, to dispute his claims. He withdrew therefore to Normandy until he could collect more troops and obtain reinforcements from England and Germany. His nearly hopeless cause, however, gradually gained strength through the weakness and internal dissensions of the Leaguers, who proclaimed the aged Cardinal de Bourbon King, with the Duke of Mayenne lieutenant general of the kingdom, and thus complicated the interests of their party. After a success at Arques (September, 1589), Henry reappeared before Paris. He won a splendid victory over Mayenne at Ivry (March 14, 1590); but Spanish intervention defeated his plans, and it is probable that he would never have been generally acknowledged had he not, by the advice of his friend and Minister, De Rosny, afterward Duke of Sully (q.v.), formally professed himself a member of the Church of Rome in 1593. "Paris," the light-hearted but astute monarch is reported to have said, "is well worth a mass." His public recantation of Protestantism, before the Archbishop of Bourges, July 25, 1593, tilted the Catholics with joy and was followed by the speedy surrender of the most important cities of the kingdom, including Paris, which opened its gates to him in March, 1594. The war with the League was not, however, terminated till 1596. In 1598 peace was concluded between Spain and France by the Treaty of Vervins, which restored to the latter many important places in Picardy and was otherwise favorable to the French King. On April 13, 1598, Henry signed the Edict of Nantes, which secured the Protestants perfect liberty of conscience and the administration of impartial justice.

Henry was now left at liberty to direct his attention to the internal improvement of the

kingdom, which had been thoroughly disorganized through the long continuance of civil war. The narrow-minded policy of the preceding reigns had left the provinces greatly at the mercy of the civil governors and large landed proprietors, who arrogated almost sovereign power to themselves in raising taxes and exacting compulsory services. Such abuses Henry completely stopped. By building canals and roads and opening all parts of his kingdom to commerce, he established new sources of wealth and prosperity for his subjects. The main-spring of these improvements was, however, the reorganization of the finances under Sully, who in the course of 10 years reduced the national debt from 330,000,000 to 50,000,000 livres. In 1601 the districts of Bresse, Bugey, and Val-romey were acquired from Savoy and added to France. For 10 years France enjoyed prosperity previously unheard of. In foreign politics Henry devoted his entire energy to the formation of a powerful coalition against the house of Austria, the ancient enemy of France, against whom, since the Treaty of Cateau-Cambrésis in 1559, the distracted country had been too weak to contend. The disputed succession to the duchies of Jülich and Cleves (q.v.) afforded an opportunity for the opening of hostilities, and the King, who had entered into an alliance with the Protestant Union of Germany, was about to take personal command of the French army, when he was struck down by the dagger of Ravallac, a religious fanatic, at Paris, May 14, 1610. Nineteen times before attempts had been made on his life, most of which it was thought could be traced to the agency of the papal and Imperial courts, and in the midst of the bitter political strife Ravallac's crime was laid to the charge of the same influences. The most horrible vengeance was wreaked on the murderer. Henry was succeeded on the throne by Louis XIII, his son by his second wife, Maria de' Medici (q.v.). Time has strengthened the high estimate which the people of France formed of their favorite King, for, although his faults were numerous, they were eclipsed by his surpassing qualities. An inordinate passion for women was his greatest failing. He was without doubt the most imposing figure in France of his day and has taken his place in history as the greatest of Bourbon kings.

Bibliography. For the history of Henry IV, consult the memoirs of the time, particularly those of the Duke de Sully (Amsterdam, 1725); also Poirson, *Histoire de Henri IV* (3d ed., Paris, 1805); Jung, *Henri IV écrivain* (ib., 1885); Guadet, *Henri IV, sa vie, son œuvre et ses écrits* (ib., 1879); Lescure, *Vie de Henri IV* (ib., 1876); Barre-Duparcq, *Histoire de Henri IV* (ib., 1884); Rambault, *Henri IV et son œuvre* (ib., 1884); Zeller, *Henri IV et Marie de Médici* (ib., 1877); Lacombe, *Henri IV et sa politique* (ib., 1878). In English the following works may be consulted: Gurney, "Henry IV," in *Chapters from French History* (London, 1870); Baird, *The Huguenots and Henry of Navarre* (New York, 1886); Jackson, *The First of the Bourbons* (London, 1890); Willert, *Henry of Navarre and the Huguenots in France* (New York, 1893); *Lettres inédites du roi Henri IV à Monsieur de Bethune* (Paris, 1901); *Cambridge Modern History*, vol. iii (London, 1904); H. de Beaumont de Pérefixe, *Memoirs of Henri IV*, trans. by John Dauncey (ib., 1904); A. C. P. Haggard, *Amours of Henri de Navarre and of*

Marguerite de Valois (ib., 1910); Bloundelle Burton, *The Fate of Henry of Navarre* (New York, 1911).

HENRY V OF FRANCE. See CHAMBORD, DUKE OF.

HENRY IV. An historical play by William Shakespeare, in two parts, produced in 1597 and 1598, printed in 1598 and 1600. The sources are Holinshed's *Chronicles* and a popular old play (produced in 1588), *The Famous Victories of Henry V*. In it the royal hero, who had appeared as a spirited youth in *Richard II*, is represented as a careworn monarch, who has passed down his boyish fire to his son, Prince Hal. The plot deals with Hotspur's rebellion and the sobering of the Prince's character through the tempering process of his nation's trial. See FALSTAFF.

HENRY V. An historical drama by William Shakespeare, a continuation of *Henry IV*, and derived from the same sources. It deals with the adventures of Prince Hal after he ascended the throne, especially with his invasion of France, and tells of the death of Henry's former boon companion, Falstaff. It was performed in 1590 and was printed in 1600, imperfectly, by Thomas Creede.

HENRY VI. An historical drama in three parts, produced in 1592-94 and printed in 1594-95, in which Shakespeare's genius can be traced, working over the cruder stuff of possibly Marlowe, Peele, Lodge, Kyd, and Greene, or some unknown dramatists. It deals with the early years of Henry VI's reign, his misfortunes during the Wars of the Roses, and his tragic death. The first part was produced in 1592 and called forth Greene's charge of plagiarism in his *Groat's Worth of Wit*. The second part, founded on an old play, *The First Part of the Contention between the Two Famous Houses of Yorke and Lancaster*, and the third part, founded on *The True Tragedie of Richard, Duke of Yorke*, were evidently elaborated and adapted by Shakespeare from works by unknown writers.

HENRY VIII. An historical drama, produced in 1613, begun by William Shakespeare and completed by Fletcher and Massinger. It is founded on Holinshed's *Chronicles* and Fox's *Christian Martyrs* and was first printed in the folio of 1623. Only Act i, Scene 1; Act ii, Scenes 3 and 4; Act iii, Scene 2; Act iv, Scene 1, can be ascribed to Shakespeare; the rest was written by Fletcher, with possibly some help from Massinger.

HENRY, ALEXANDER (1739-1824). An American fur trader, born in New Brunswick, N. J. He was with General Amherst in the expedition against the French in Canada (1760). After the peace he went to Mackinac to engage in the fur trade and was one of the few survivors when the English garrison of the fort was massacred by the Indians at the time of Pontiac's uprising (1763). Henry remained for a year a captive among the Ojibways at Sault Ste. Marie, whence he came with an Indian contingent to join General Bradstreet's army on the lakes and by the desertion of his battalion regained his liberty. He resumed the fur trade, voyaging between Montreal and the Rocky Mountains, and from 1770 to 1774 made an unsuccessful attempt to float a company for working the copper mines on Lake Superior. His book, *Travels and Adventures in Canada and the Indian Territory between the Years 1760*

and 1776 (1809), is quoted at length in Parkman, *Conspiracy of Pontiac* (London, 1868). Consult also Grinnell, *Trails of the Pathfinders* (New York, 1911).

HENRY, CALEB SPRAGUE (1804-84). An American Protestant Episcopal clergyman and author. He was born in Rutland, Mass., graduated at Dartmouth in 1825, and studied theology at Andover and New Haven. In 1828 he became a Congregational minister at Greenfield, Mass., and in 1833 removed to Hartford, Conn. In 1834 he started the *American Advocate of Peace*, the organ of the American Peace Society. He then entered the ministry of the Protestant Episcopal church and was professor of moral and intellectual philosophy in Bristol College, Pennsylvania (1835-38). In 1837, with the aid of Rev. Francis L. Hawks, he established the *New York Review*. He was professor of history and philosophy in New York University from 1839 to 1852. Later he was rector of various churches, but was chiefly engaged in literary work. He translated Guizot's *History of Civilization* and other works from the French and was the author of several works, including *Compendium of Christian Antiquities* (1837), *Social Welfare and Human Progress* (1860), and *Satan as a Moral Philosopher* (1877).

HENRY, CAPE. See CAPE HENRY.

HENRY, ANRÉ, CHARLES (1859-). A French librarian and editor. He was born at Bollwiller, Haut-Rhin, and was educated in Paris, where in 1881 he became assistant and afterward librarian in the Sorbonne. As a specialist in the history of mathematics, he was sent to Italy to seek some manuscripts of that nature which the government wished to publish. He edited several works upon kindred subjects, as well as memoirs, letters, and other volumes, and wrote critiques upon the musical theories of Rameau and Wronski. He is also credited with the invention of several ingenious devices and instruments still used in psychophysiological laboratories. C. Huet's correspondence he published under the title *Un érudit, homme du monde, homme d'église, homme de cour* (1880), and he issued also *Problèmes de géométrie pratique* (1884) and *Lettres inédites de Mlle. de Lespinasse à Condorcet et à D'Alembert* (1887).

HENRY, EDWARD LAMSON (1841-). An American genre painter. He was born in Charleston, S. C., Jan. 12, 1841, and studied at the Philadelphia Academy with Peter Weber and from 1860 to 1863 with Suisse and Courbet in Paris. He returned to the United States during the Civil War and sketched on the James River. In 1869 he was elected a member of the National Academy and established a studio in New York. He became a member also of the American Water Color Society. Notwithstanding a foreign training, his art is excessively native in subject and execution. He depicts the life of the middle of the century, particularly country scenes with quaintly dressed people, buggies, farmhouses, in hard outlines, crude colors, and with excessive detail. One of his largest paintings is the "Initial Excursion of the First Railway Ever Constructed in New York State," Albany Historical Society, containing 50 figures. His principal works are: "Old Clock on the Stairs" (1868); "City Point, Grant's Headquarters" (1869), Union League Club, New York; "Battle of Germantown," owned by William Astor; "Declaration of Independence," owned by J. W. Drexel; "Reception

to Lafayette"; "In Sight of Home"; "Waiting for an Answer."

HENRY, ANRÉ, ETIENNE OSSIAN (1798-1873). A French chemist, son of Noël Etienne Henry (1769-1832), born in Paris, and trained by his father, who was director of the Central Pharmacy of the Parisian hospitals and professor in the School of Pharmacy. In 1824 he became director of the chemical laboratory of the Academy of Medicine. He discovered sinapin and studied mineral waters, the milk of various animals, nicotine, and tannin. His works include: *Traité pratique d'analyse chimique des eaux minérales* (2d ed., 1858), with his father; *Mémoire sur l'analyse organique* (1830), with Plisson; *Analyse chimique des eaux de Paris* (1848), with Boutron-Charland; and a translation of the *Codex Medicamentarius* (1827), with Ratier.

HENRY, GEORGE (?-). A Scottish painter, one of the most prominent of the Glasgow school. He was born in Ayrshire and studied at the Glasgow School of Art, later in Macgregor's studio, but learned most from his nature studies at Kirkcudbright. He was influenced also by his collaboration with E. A. Hornel (q.v.) in such works as "The Druids" (1837), Grosvenor Gallery, London. His "Galloway Landscape" was epoch-making at Glasgow by reason of its higher key of color and essentially decorative character. Following these tendencies, the two friends spent a year and a half in Japan. Henry's importance consists in his influence on the Glasgow school in the direction of richer and more decorative color. In addition to genre and landscape, he also paints portraits, more distinguished by technical ability than by rendition of character. Henry's pictures in public collections include "The Blue Gown," Museum of Cape Town, "The Gray Hat," at Edinburgh, two portraits at Glasgow, and one at Montreal. He was elected a member of the Royal Scottish Academy (1902) and an associate of the Royal Academy. Consult the works cited in the article GUTHRIE, SIR JAMES.

HENRY, JOSEPH (1799-1878). An American physicist, born at Albany, N. Y., Dec. 17, 1799. He was educated at the Albany Academy, where in 1826 he became professor of mathematics and natural philosophy. Henry earned the reputation of being one of the greatest of experimenters and did more towards the development of the science of electricity than any other American. At the Albany Academy he developed the electromagnet, which had been invented a few years previously by Sturgeon of England. By insulating the wire with silk and constructing the apparatus according to certain original ideas, he obtained electromagnets of far greater power and efficiency than those of other experimenters and also transmitted the current from the battery through a considerable length of wire to the magnet. The essential feature of his apparatus was the winding of the wire on a bobbin-like thread on a spool. He wound several coils, with separate terminals, on the same bobbin. If these coils were joined in parallel, he had a "quantity magnet," with great lifting power; if they were joined in series, he had an "intensity magnet," which could be used to perform work at a great distance from the battery, provided this last was sufficiently strong. This discovery of Henry's marked an epoch in electricity. In 1831 Henry sent a current through a mile of fine copper

wire and caused the armature of the electromagnet to be attracted and strike a bell, thus producing an audible signal. This is the first electromagnetic telegraph, and Henry is to be regarded as the inventor of the principle now universally applied in modern practice. In further experiments at Princeton, where Henry was appointed professor of natural philosophy in 1832, he devised an arrangement of electromagnets and batteries, where the current transmitted to a considerable distance energized a magnet and attracted an armature which opened a "local" circuit with its battery and caused a powerful electromagnet to perform work by allowing a weight to fall. This experiment contains the principle of the telegraph relay which made possible telegraphy over considerable distances. The apparatus was set up between Henry's residence and laboratory at Princeton, and the earth was used as a return conductor for the first time. Henry was also the first to employ magnetic attraction and repulsion to produce motion and constructed a simple magnetic engine which had the first automatic pole changer or commutator ever applied to the galvanic battery.

Henry's greatest contribution to electricity was the discovery of the method of producing induced currents—the underlying principle of dynamos, transformers, etc. In this he anticipated Faraday by some years, although part of his work was not published for several years. He discovered the phenomena of self-induction in August, 1829, and of mutual induction in August, 1830.

Later, in 1842, while at Princeton, he discovered that in the discharge of a Leyden jar the phenomenon is an oscillating one, and further that this discharge would induce discharges in other circuits at a considerable distance; in other words, he discovered the essential phenomena of wireless telegraphy. In 1846 he was chosen secretary of the Smithsonian Institution at Washington, a position that he held until his death, on May 13, 1878. In 1849 he was elected president of the American Association for the Advancement of Science, and in 1858 he was chosen president of the National Academy of Sciences, of which body he was an original member. Upon the establishment of the Lighthouse Board in 1852, Professor Henry was appointed a member and in 1871 became its head. He carried on in this capacity a number of important tests for the government which resulted in the improvement of fog signals and the various lights and lighthouses. He was also interested in meteorology, and in his reports, as secretary, he urged the government to collect and distribute meteorological information. He suggested the use of the telegraph for this purpose, and for a number of years this important work was under the direction of the Smithsonian Institution. Terrestrial magnetism was also a subject of interest to Henry, and he not only participated in investigations on his own account, but urged upon the government the importance of having such observations made. In acoustics Professor Henry also carried on important researches, his attention being directed to this subject largely through his experiments with fog signals. Henry enjoyed no small amount of European reputation, and in his trips abroad was enthusiastically received by English and continental scientists.

Henry was involved in a controversy with S. F. B. Morse (q.v.) as regards the invention of the telegraph, but it is safe to state that the former is to be regarded as the originator of the principle, while Morse perfected the method for using the electromagnet for commercial purposes. Morse, in the course of his work, met difficulties which he could not overcome until his attention was called to Henry's inventions. Henry's collected writings are to be found in the *Smithsonian Miscellaneous Collection*, vol. xxx (Washington, 1887). In volumes xx and xxi of the same series are to be found excellent biographical and memorial notices. Consult also Dickerson, *Joseph Henry and the Magnetic Telegraph* (New York, 1885).

HENRY, MATTHEW (1662-1714). An English Nonconformist divine and Bible commentator. He was born in Flintshire, near Chester, Oct. 18, 1662. Having qualified himself for the ministry, in 1687 he was settled as Presbyterian pastor at Chester, where he continued for 25 years. In May, 1712, he removed to a charge at Hackney, near London. He died June 22, 1714. His principal work is an *Exposition of the Old and New Testament*, which was commenced in November, 1704, and five volumes appeared in London prior to 1710. He lived to finish it only to the Acts of the Apostles, and the remainder was finished by 13 Nonconformist ministers, whose names are given in some of the editions. For many years, though of no critical value, this was the standard commentary on the Bible. It has been often reprinted; e.g., by Burder and Hughes, with additional matter from Henry's manuscripts (6 vols., London, 1811). Besides his commentary, Henry published numerous volumes, as well as sermons and tracts. His miscellaneous works were republished in London in 1830. For his life, consult Williams (London, 1828; new ed., 1865), and *Diaries and Letters of Philip Henry* (his father), edited by Lee (ib., 1883).

HENRY, O. The pen name of (WILLIAM) SYDNEY PORTER (1862-1910), a prolific and popular American short-story writer, whose work afforded an astonishing amount of diversion to the readers of his day. Born in Greensboro, N. C., he passed his early years in the South and Southwest, wandering from place to place and experiencing the ups and downs of a varied journalistic career. He finally settled in New York. He has written of Western or Southwestern life—in *Heart o' the West* (1907) and *Roads of Destiny* (1909), e.g.—and the scene of *Cabbages and Kings* (1904) is Central America. But it is in his stories of New York that his best work is found. In these tales shop girls, office boys, clerks, tramps, and the flotsam and jetsam of a great city are his favorite subjects, and he presents sympathetically, as the case may be, domestic life, daily tasks, and occasional holidays, or the shifts and expedients of the homeless. A beguiling storyteller, ready in invention, facile in sentiment, rapid in narrative, picturesque in description and characterization, he yet lacked so evidently certain qualities belonging to the enduring work of the past that his chances of future appeal would seem uncertain. Time will perhaps complain of his inordinate delight in the passing slang of the hour, of his indifference to the demands of style, of the limitations of his psychology, and of his emotional leanness. He came to be universally known by his pen name.

His numerous books, in addition to those named above, include: *The Four Million* (1906); *The Trimmed Lamp and Other Stories* (1907); *The Gentle Grafter* (1908); *The Voice of the City: Further Stories* (1908); *Options* (1909); *Strictly Business: More Stories, Let me Feel your Pulse, Whirligigs, The Two Women* (1910); *Sizes and Scvens* (1911); *Rolling Stones* (1912). His *Works* were published in New York, 1912.

HENRY, PATRICK (1736-99). An American orator and statesman, born in Hanover Co., Va., May 29, 1736. His father was a native of Scotland and a cousin of Robertson, the celebrated historian. His mother was one of a family named Winston, of Welsh descent, noted for musical and conversational talent. Patrick was unpromising as a scholar, and when he was 15 years old he was placed at work with a country tradesman. After a year's apprenticeship he was set up in business with his brother William, but before the end of a year the undertaking had to be abandoned. He was slovenly in dress and showed no aptitude for business of any kind. At the time that he married the daughter of a farmer, a Miss Shelton, his business had collapsed, and he was wretchedly poor. He next tried farming for two years, but had neither perseverance nor knowledge, and after one more of many failures he opened a store and failed within the next three years. When no customers appeared, he would close his store and go fishing. But at intervals he read such books as he could find, especially histories of Greece and Rome, of England, and of the American Colonies, and managed to gain a fair idea of Latin and Greek. Having utterly failed in farming and in trade, he made an attempt at the law, and after a period of reading said to have extended over only some six weeks, and confined to *Coke upon Littleton* and a *Digest of the Virginia Acts*, he had the boldness to ask for license to practice. This was granted in 1760, on the condition that he would extend his studies before undertaking to practice. In 1763 he leaped into immediate prominence in his profession. He was then engaged in the place of a more experienced advocate, who refused to continue the defense in a celebrated case known as the "Parson's Cause," and by an unexpectedly brilliant speech aroused such intense excitement that the audience seized him and bore him in triumph on their shoulders. (See PARSON'S CAUSE.) Thereafter his practice was enormous and his prosperity assured. But he was not satisfied with his legal profession. In 1765 he became a member of the House of Burgesses from Louisa County. At the critical period of the Stamp Act excitement he was comparatively unknown to the Assembly, which was composed of the most distinguished men in the Colony, and the rich planters were scandalized at his presumption in offering to the House the brief resolutions which set forth that the burgesses and the Governor had the exclusive right and power to lay taxes and imposts upon the people of the Colony, and that not alone the Stamp Act, but all acts of Parliament which encroached upon the rights of the Colonies, were unconstitutional and therefore void. A storm of opposition from the conservative members naturally followed, and the resolutions were denounced as extreme, impolitic, and dangerous. In the debate he startled even the radicals by his historic outburst: "Cæsar

had his Brutus, Charles the First his Cromwell, and George the Third—" [here he was interrupted by the presiding officer and members with cries of "Treason! treason!"]—"may profit by their example," calmly said the orator, completing the sentence, adding, "If this be treason, make the most of it." The resolutions were adopted by a very small majority. They were printed in the newspapers of the North and South as the "Virginia Resolves" and indeed proved "an alarum bell to the disaffected." He was now a power in the Colony, replaced the vacillating planters in the leadership, and became the authorized representative of the people against the aristocratic element. In opposition to parliamentary imposts and in preparing the articles of association to discourage the use of British merchandise, Henry was one of the leaders. He was a member of the new House of Burgesses, elected in 1769, representing Hanover County. He continued his legal business and, though deficient in legal education, was wonderfully successful before juries. At this time he took an active part in the movement for securing the rights of the Dissenters, which finally culminated in the Religious Freedom Act of 1785, by which the Church of England was disestablished in Virginia. Patrick Henry, with Jefferson and others, was ready to precipitate an open rupture with England. He was especially active in the House of Burgesses, and in May, 1774, took a leading part in those acts of the House with reference to the Boston Port Bill which led to its immediate dissolution by Lord Dunmore. Upon the following day (May 27) was held the historic meeting of the former burgesses in the Raleigh Tavern, as a result of which came the first Revolutionary convention of Virginia (August, 1774), of which Henry was a member, and by which he was chosen a delegate to the first Continental Congress. In that famous assembly he was hailed as the champion of constitutional liberty, and his wonderful eloquence was at once recognized. He served on the committee on trade and manufactures, on the committee to prepare an address to the King, and on that appointed to draft a statement of the rights of the colonists. Returning thence to Virginia, his prominence was still further enhanced by his work in the Provincial Convention of March, 1775, where he introduced resolutions to organize the militia and put the Colony in an attitude of defense, which met with great opposition. He replied by a speech in which, according to one version, occur the words: "There is no retreat but in submission and slavery. Our chains are already forged. Their clanking may be heard on the plains of Boston. The next gale that sweeps from the north will bring the clash of resounding arms. Our brethren are already in the field. Why stand we here idle? What is it that gentlemen wish? What would they have? Is life so dear or peace so sweet as to be purchased at the price of chains and slavery? Forbid it, Almighty God! I know not what course others may take, but as for me, give me liberty or give me death!" Without an opposing voice the resolutions were adopted, and a committee, with Henry as chairman, was appointed to prepare a plan for the defense of the province. Soon thereafter the royal Governor, Dunmore, caused to be removed on shipboard much of the province's supply of powder. The people took up arms, and being told that the powder would be

returned, they at once disbanded. Henry, however, seized the favorable moment, gathered a force of militia, and marched upon Williamsburg to demand the powder or compensation. An agent of Dunmore's met him and paid him £300 for the powder. Henry was denounced for stirring up sedition; but it was too late to talk of loyalty; the province was aroused, and in June Dunmore took refuge on a man-of-war. A convention assembled at Richmond in July, 1775, and appointed a committee of public safety with most extensive powers. Two regiments were enlisted, and Henry was appointed commander of all the forces to be raised. The first collision was at Great Bridge, where the Virginia militia gained a triumph over trained British troops and drove Dunmore back to his ship. Henry should naturally have been the leader of the troops, but the active command was given to Col. William Woodford. Henry was disappointed and resigned. In the convention of May, 1776, at Williamsburg, when the delegates to the Continental Congress were instructed to demand the independence of the Colonies, he took an active part and was chosen by that convention one of the committee which prepared the first constitution of the Commonwealth of Virginia. In that year he was chosen by the convention, which then exercised the power of election later exercised by the Assembly, to be Governor of Virginia, and was re-elected until 1779, when he became ineligible; and more than once during his occupancy of the office the Legislature conferred upon him, in times of crisis, practically dictatorial powers. He returned to the Legislature, in which he served until 1784, and was then once more chosen Governor, without opposition, serving until 1786, when he finally resigned. In 1788 he was a member of the convention which ratified for Virginia the Federal Constitution, which instrument he vigorously opposed, chiefly on the ground that it failed properly to protect the rights of States and individuals against the extreme centralization of power in the Federal government. Seeing that he could not defeat Madison, the great advocate of the Constitution, he used his influence for ratification with amendments. In 1794 he declined a seat in the United States Senate, and in 1795 Washington offered him the position of Secretary of State, but he declined. He also declined the office of Chief Justice of the United States Supreme Court, and Adams's offer of a special mission to France, as well as an election as Governor in 1796. He was elected to the House of Delegates in 1799, but did not live to take his seat, dying on June 6 of that year. Consult: Tyler, *Patrick Henry* (Boston, 1887; new ed., 1899), in the "American Statesmen Series"; Wirt, *Sketches of the Life and Character of Patrick Henry* (2d ed., Philadelphia, 1818); William Wirt Henry, *Life, Correspondence, and Speeches of Patrick Henry* (3 vols., New York, 1891); Morgan, *The True Patrick Henry* (Philadelphia, 1907).

HENRY, ANRÉ, PAUL PIERRE (1848-1905). A French astronomer, born at Nancy. With his brother, PROSPER MATHIEU HENRY (1849-1903), also born at Nancy, he did much for the perfection of astronomical photography, in the course of their labor of completing the *Atlas éclipse* of Chacornac. The brothers joined the staff of the Paris Observatory as assistants in 1864 and were made adjunct astronomers in

1876, while in 1893 Prosper became titular astronomer. From 1887 they confined themselves almost entirely to photographic work in connection with the International Chart of the Heavens. The older brother discovered the Comet III (1873) and the planetoids 126, 141, 152, 159, 164, 177, and 227, and Prosper discovered the planetoids 125, 127, 148, 154, 162, 169, and 186.

HENRY, PHILIP. See STANHOPE, EARL.

HENRY, PHILIP (1631-96). An English Nonconformist clergyman, born in London. He graduated at Oxford in 1652 and was ordained in 1657. His career as a preacher was repeatedly interrupted by the religious persecutions of his time, and it was not until the Act of Toleration was passed in 1687 that he was allowed to pursue his calling unmolested. The remaining years of his life were spent in unceasing labor. His *Diaries and Letters*, published in 1882, gives a detailed account of the Nonconformist life of his period.

HENRY, PRINCE OF PRUSSIA (HEINRICH ALBERT WILHELM) (1862-). A German admiral. The son of Frederick III, Emperor of Germany, and brother of William II, he was born in the New Castle at Potsdam. He was educated in the Gymnasium at Kassel (1875-77) and in the Marine Academy (1884-86). In 1888 he married Irene, Princess of Hesse; to them were born Princess Waldemar (1889), Sigismund (1896), and Henry (1900; died 1904). He traveled around the world in 1878-80, and visited the United States in 1882-84 and in 1903, and South America in 1914. Everywhere he went he was notably popular. He became a naval officer in 1880 and was rapidly promoted, becoming admiral in 1901, chief of the active battleship fleet in 1906, and general inspector of marine. He was made also a field marshal general in the Prussian army. When the War in Europe (q.v.) broke out in 1914, he held the chief command of the German fleet.

HENRY, ROBERT (1718-90). A Scottish historian and Presbyterian minister. He was born in St. Ninian's Parish, Stirlingshire, was educated at Edinburgh University, and after a term of school-teaching entered the Church, his first charge being at Carlisle. For the last 22 years of his life he was in Edinburgh churches—New and Old Grey Friars—and found opportunity to compile his *History of England on a New Plan* (6 vols., 1771-93), of which the last volume was published after his death. Henry's "new plan" of grouping social progress in periods is no longer new and has been followed out with greater accuracy since his time.

HENRY, ANRÉ, VICTOR (1850-1907). A French philologist, born at Colmar. He studied both law and philology, but finally devoted himself exclusively to the latter, and was appointed professor of Sanskrit and comparative linguistics at the University of Lille. In 1880 he was transferred to a similar position in the faculty of letters at Paris. A remarkably versatile scholar, his writings cover a wide range of linguistics. Among them are: *Esquisse d'une grammaire de la langue innok* (1878); *Esquisse d'une grammaire raisonnée de la langue aléoute* (1879); *La distribution géographique des langues* (1880); *Esquisses morphologiques* (1882-90); *Précis de grammaire comparée du grec et du latin* (Paris, 1888; Eng. trans. by R. T. Elliot, 1890); *Précis de grammaire comparée*

de l'anglais et de l'allemand (1893; Eng. trans. by the author, London, 1894); *Manuel pour étudier le sanscrit védique* (1890); *Le livre septième de l'Ātharva-Vēda* (1892); *Lexique étymologique du breton moderne* (1900); *La magie dans l'Inde antique* (1904); *Le dialecte alaman de Colmar (Haute-Alsace) en 1870; grammaire et lexique* (1900); *Éléments de sanscrit classique* (1902); *Les littératures de l'Inde: sanscrit, pâli, prācrit* (1904); *Précis de grammaire pâlie* (1904); *Le parsisme* (1905); *L'Agnistoma* (1906-07), in collaboration with Caland.

HENRY, WILLIAM (1775-1836). An English chemist. He studied chemistry and medicine at the University of Edinburgh and received the degree of M.D. from that university in 1807. Henry devoted himself mainly to investigations in chemistry. He was the author of several papers in the *Philosophical Transactions* (chiefly on the chemistry of gases); and his *Elements of Experimental Chemistry*, originally published (1799) under the title of *An Epitome of Chemistry*, passed through numerous editions. He is remembered chiefly as the discoverer of the important law according to which the amount of any gas absorbed by water is proportional to the pressure exercised upon the gas. The law would (apparently) cease to hold true if the gas and the solvent water entered into chemical combination. But assuming that no chemical change is involved, Henry's law is to-day known to hold true, approximately, not only in the case of water, but for all solvents whatever. In 1914 Henry's law was shown to be deducible thermodynamically, and to be generally reliable in dilute solutions (containing not much more than 5 gram molecules of the dissolved gas or vapor for every 95 gram molecules of the solvent; in other words, not much more than 5 "molecular per cent" of the dissolved gas). Within such limits of concentration Henry's law is all but precisely true in the following form: *The molecular per cent of a gas taken up by a solvent is proportional to the pressure attained by the gas when no more of it goes into solution.*

HENRY, WILLIAM ALEXANDER (1816-88). A Canadian jurist. He was born in Halifax, was called to the bar in 1840, a year later was elected a Liberal member of the Nova Scotia Legislative Assembly, and became mayor of Halifax. In 1849 he was appointed a member of the provincial administration, holding successively the offices of Solicitor-General, Provincial Secretary, and Attorney-General. He was instrumental in establishing a system of telegraphs for the province, and also in revising the provincial statutes. He strongly supported the movement for Canadian confederation, and while Attorney-General was one of the representatives of Nova Scotia at the Charlottetown Conference, and later at the Quebec Conference (1864), held to promote federal union of the provinces. In 1866 he was a delegate in behalf of the continuation between the United States and Canada of the reciprocity treaty abrogated in that year, and in the same year also was one of the delegates who met in London and arranged with the British government the provisions of the British North America Act, which, when finally adopted and enacted by the Imperial Parliament, constituted the Dominion of Canada. In 1875 Henry was appointed a judge of the Supreme Court of Canada.

HENRY, WILLIAM WIRT (1831-1900). An American lawyer and historical writer. He was born at Red Hill, Charlotte Co., Va., was educated at the University of Virginia, and was elected to the State Legislature, where he attended four sessions. In addition to the practice of his profession he was deeply interested in historical studies and became president of the American Historical Association (1890) and of the Virginia Historical Society. He is the author of the *Life, Correspondence, and Speeches of Patrick Henry* (3 vols., 1891), besides historical addresses and essays.

HENRY AND EM'MA. A poem in dialogue, published in the collected edition of Prior's works in 1709. It is founded on the old English ballad *The Nut-Brown Maid*.

HENRY ESMOND, Ez'mond. A novel by Thackeray, published in 1852, and one of the finest historical romances in English. The scene is laid in England in the reign of Queen Anne. The hero is a young colonel in the army, at first deeply in love with the beautiful daughter of his guardian, but finally married to her mother, the widowed Lady Castlewood. See ESMOND, BEATRIX; CASTLEWOOD, LORD AND LADY.

HENRY OF BLOIS, blwü (1101-71). An English prelate, son of Stephen, Count of Blois, and brother of Theobald, Count of Blois and Champagne, and of King Stephen. He was brought up at Clugny, came to England in 1126, was made abbot of Glastonbury, and, three years later, Bishop of Winchester. After the death of Henry I he did all in his power to gain the crown for Stephen and at the coronation pledged his word that the liberty of the Church would be kept intact. Henry failed in his candidacy for the see of Canterbury (1136-38), but in 1139 he was appointed papal legate. As such, he opposed the imprisonment of the bishops of Salisbury and Ely and at the Council of Winchester charged Stephen with sacrilege. In the quarrel between the King and Matilda he gradually went over to the side of the latter and swore allegiance to her in 1141. But he quarreled with her soon after and was rescued from her besieging army by the forces of Stephen. In 1143, Pope Innocent II having died, the commission of Henry expired, Theobald was appointed as his successor, and Henry's power at Rome was over. Five years later he was suspended because of his advice to Stephen that Theobald should not be allowed to attend a papal council at Rheims. Towards the close of the civil war all Henry's energies were bent on the hastening of peace. He assisted at the coronation of Henry II, but was afterward under the King's displeasure because of his leaving England without the royal consent (1155). Henry opposed Thomas à Becket's policy and defended the King in 1166 and 1167. He died soon after the death of the Archbishop, for which he bitterly condemned the King.

HENRY OF HUNTINGDON (c.1084-1155). An English historian, the son of Nicholas, a churchman, who was possibly Archdeacon of Huntingdon. He spent his early years at Lincoln in the home of Bishop Robert Bloet, where Albinus of Angers was his teacher. In 1109 or 1110 he was made Archdeacon of Huntingdon. In 1139 he went to Rome and at this time became acquainted with the *Historia Britonum* by Geoffrey of Monmouth. This and a request of Alexander, Bishop of Lincoln, prompted him to write his *Historia Anglorum*, which in

the last edition came down to 1154. This work is a mere compilation, with occasional touches of pure imagination, for the period to 1127, where the author's personal knowledge begins. The following works are also ascribed to Henry: *Epigrammata Libri VIII*, of which two books are extant, and one is printed in Wright's *Anglo-Latin Satirical Poets and Epigrammatists of the Twelfth Century* (in the "Rolls Series," 1872); *De Amore*; *De Herbis*; *De Aromatibus*; and *De Lege Domini*. The history is reprinted from Savile, *Scriptores post Bedam* (1596); in Migne, *Patrologia*, vol. xciv (1854), and translated by Forester (1853). For his biography, consult Liebermann (Göttingen, 1878); J. Gairdner, *Early Chroniclers of Europe: England* (London, 1879).

HENRY OF LAUSANNE, lō'zàn'. See HENRICIANS.

HENRY II OF TRASTAMARE, trā'stāmā'rā (c.1332-79). King of Castile, 1366-67 and 1369-79. He was the oldest son of King Alfonso XI of Castile by his mistress, Leonora de Guzman. Alfonso gave him the County of Trastamare; but when, in 1350, Peter the Cruel, Henry's half brother, ascended the throne, Dofia Leonora was imprisoned and soon after murdered, while her sons had to flee for their lives. Peter the Cruel continued in his career of assassination until, in 1356, the nobles began a revolt under the leadership of Don Juan de Albuquerque and the illegitimate children of Alfonso. The rebellion was soon suppressed; Henry escaped, while most of the others were executed. In 1360 the Peace of Bretigny between England and France set free bands of marauders who united under the name of Free Companies. Charles V, King of France, in order to rid his country of them, sent them in 1365, under the leadership of the great General Bertrand Du Guesclin, against Peter the Cruel, who was aided by the English under the Black Prince. In 1366 Henry of Trastamare entered Castile and was crowned as Henry II, and Peter fled to the Black Prince at Bordeaux. By the Treaty of Libourne (Sept. 23, 1366) the English agreed to use their utmost efforts to restore Peter in return for the Lordship of Biscay. They fulfilled their promise, and the Black Prince won the decisive battle of Najera on April 3, 1367, and Henry again became a fugitive. But the departure of the English left Peter defenseless, and in 1369 Henry returned and was welcomed by Madrid and other cities as far south as Cordova. Peter tried to bribe Du Guesclin to help him to escape, but the latter betrayed him to Henry, who put him to death. The crown was now claimed by Ferdinand of Portugal and somewhat later by John of Gaunt, who in 1371 had married Constance, a daughter of Peter the Cruel! But Henry was able to overcome, with French assistance, all attacks and developed into a good and liberal ruler. Consult Burke, *History of Spain*, vol. i (London, 1895), and Altamira, *Historia de España*, vol. i (Madrid, 1901).

HENRY'S LAW. See HENRY, WILLIAM.

HENRYSON, ROBERT (c.1430-?1506). A Scottish poet. He seems to have been educated abroad, as his name does not appear in the registers of the University of St. Andrews, the only one existing in Scotland in his youth. When he was admitted, in 1462, to the newly founded University of Glasgow, he was called "the venerable Master Robert Henrysone, Licentiate in

Arts and Bachelor in Decrees." He probably took orders, and was schoolmaster and notary public at Dunfermline. Henryson, who had the finest poetic talents of all the followers of Chaucer, wrote a sequel to *Troilus and Cressida* entitled the *Testament of Cressida*. He resumes the story where Chaucer leaves off, and completes it by inflicting a suitable punishment on the false woman. This continuation displays so much skill that it was included in the earlier editions of Chaucer, as if it had been the work of that poet himself. Another poem, "Robene and Makyne," though short, is remarkable as the first known specimen of pastoral poetry in the Scottish language. Henryson wrote several beautiful lyrics and made a metrical translation of Æsop, adding morals of his own suitable to his time. In these fables he displays admirable sense and humor. The first complete edition—*Poems and Fables* (1865)—was edited by D. Laing. A three-volume edition (1907-08) was brought out by the Scottish Text Society and edited by G. G. Smith. Consult J. H. Millar, *Literary History of Scotland* (New York, 1903), and the second volume of *Cambridge History of English Literature* (ib., 1907).

HENRY THE DEACON. See HENRICIANS.

HENRY THE HYPOCRITE. See HEINRICH DER GLICHEZARE.

HENRY THE LION (1120-95). Duke of Saxony and Bavaria. He was the son of Duke Henry the Proud. When only 10 years of age, he lost his father, who had engaged in a war with the Emperor Conrad III of the house of Hohenstaufen, and who had been stripped of his Bavarian possessions. For seven years the young prince's mother, Gertrude, and his grandmother, Richenza, ruled his paternal dominions in Saxony. In 1146 Henry assumed the reins of government, and at the Diet of Frankfort in the following year he demanded of the Emperor Conrad the restoration of the Duchy of Bavaria, which had been wrested from his father. This was refused, and Henry, in concert with his uncle Welf (Guelph), had recourse to arms; but his efforts were crushed by the energetic measures of Conrad. After the death of this Emperor, however, Bavaria was given up to him by his cousin, the Emperor Frederick Barbarossa, who formed with him a close friendship (1156). Henry's possessions now extended (not continuously, however) from the North Sea and the Baltic to the shores of the Adriatic (including some territories in Italy), and he was by far the most powerful prince in the Empire, rivaling in influence the Emperor himself. In 1166 a league comprising the archbishops of Bremen and Magdeburg, the bishops of Halberstadt and Hildesheim, the Margrave of Brandenburg, and the Landgrave of Thuringia, was formed against him. He triumphed only after two years of hard fighting. About this time he separated from his first wife and married Matilda, daughter of Henry II of England, soon after which event he undertook an expedition to Palestine (1172). Henry broke his alliance with the Emperor by refusing to join in the Italian expedition of 1176, thus contributing to Frederick's defeat at Legnano. (See ITALY.) The wrath of the Emperor was kindled, and the numerous enemies of Henry the Lion again combined against him; he was summoned to appear at three different diets, and, refusing, was put under the ban of the Empire in 1180. By 1181 his fortunes were at so low an ebb that he was

forced to ask mercy of the Emperor at Erfurt; but all that he could get was permission to retain his hereditary territories of Brunswick and Lüneberg, and even this was on the condition of his going into exile for three years. Henry, in consequence, went with his family to England; but returned to Brunswick in 1185, where he lived quietly. On the departure of Frederick for Palestine in 1189 Henry again was obliged to withdraw to England; but he soon returned, and engaged once more in wars with the petty princes of the North, achieving little, however. A little later he took up arms against the Emperor Henry VI, but was finally reconciled with the Hohenstaufen. He died at Brunswick, Aug. 6, 1195. Consult: Prutz, *Heinrich der Löwe* (Leipzig, 1865); Philippson, *Geschichte Heinrichs des Löwen* (2 vols., ib., 1867); Giesebrecht, *Geschichte der Kaiserzeit*, vol. v (ib., 1888).

HENRY THE MINSTREL, or **BLIND HARRY**. A Scottish poet, who flourished 1470-92. Scarcely anything is known of him beyond what is told by John Major in his Latin *History of Scotland* (1521). "When I was a child," he says, "Henry, a man blind from his birth, who lived by telling tales before princes and peers, wrote a book of William Wallace, weaving the common stories (which I, for one, only partly believe) into vernacular poetry, in which he was skilled." In 1490-92 Blind Harry is found at the court of King James IV, receiving occasional gratuities of 5, 9, and 18 shillings. The poem attributed to him, *The Life of that Noble Champion of Scotland, Sir William Wallace, Knight*, was completed before the end of 1488, when it was copied by John Ramsay. This copy, the oldest manuscript of the work now known to exist, does not ascribe it to Blind Harry, nor is his name given to it in the earlier printed editions. The poem, which contains 11,861 lines, composed in the heroic couplet, is altogether a wonderful performance, for the blind minstrel must have carried it all in his memory. The style is simple and vigorous and at times eloquent. While the poem undoubtedly has a basis in fact, it is to be regarded mainly as a fiction woven out of popular traditions and written in the spirit of the metrical romances. The first extant edition is dated 1570. Immensely popular in Scotland for 200 years, its place was supplied in 1722 by the poor modernized version of William Hamilton, of Gilbertfield. Consult Moir, *A Critical Study of Blind Harry* (Aberdeen, 1888), and a critical edition of the original poem, edited by Moir for the Scottish Text Society (Edinburgh, 1885-87).

HENRY THE NAVIGATOR (1394-1460). A Portuguese prince, celebrated as a munificent patron of voyagers and explorers. He was the fifth son of John I, King of Portugal, and was born at Oporto, March 4, 1394. He first distinguished himself at the conquest of Ceuta in 1415. Soon after this he took up his residence at the town of Sagres, not far from Cape St. Vincent, and while prosecuting the war against the Moors of Africa exerted himself in every way to decipher the mystery of the great continent upon which the Portuguese had but recently set foot. Under his inspiration Portuguese sailors reached parts of the ocean which the navigators of the time had long supposed to be inaccessible. The grand ambition of Henry was the discovery of unknown regions of the world. At Sagres he founded an observatory, to which he attached a school for the instruc-

tion of youthful scions of the nobility in the sciences necessary to navigation. Subsequently he dispatched some of his pupils on voyages of discovery along the western coast of Africa. Creeping down the coast by short and steady stages, these expeditions during Prince Henry's lifetime succeeded in unraveling the unknown shore line of Africa to within 15° of the equator. The Madeira Islands had been reached in 1420; in 1434 Cape Bojador was doubled; in 1441 Cape Blanco was reached; in 1445 Cape Verde, in Senegambia, was doubled; and in 1455 Cadamosto reached the mouth of the Gambia. Prince Henry died at Sagres, Nov. 13, 1460; but the impulse which he had imparted to the maritime enterprise of the Portuguese continued for more than 50 years after his death and resulted in the circumnavigation of Africa and in the upbuilding of a Portuguese empire in India and in Brazil. The science of navigation, which before his time can hardly be said to have constituted a science at all, is indebted to Prince Henry for many important improvements. Consult: Major, *Life of Prince Henry of Portugal* (London, 1868); id., *Discoveries of Prince Henry the Navigator* (ib., 1877); Beazley, *Prince Henry the Navigator* (ib., 1895); J. P. Oliveira Martins, *The Golden Age of Prince Henry the Navigator* (New York, 1914). See AFRICA, *History and Exploration*.

HENSCHÉL, hén'shel, SIR GEORGE (1850-). A German-English composer and vocalist, born at Breslau. His first teacher was Schaeffer; subsequently he studied under Moscheles and Wenzel for the pianoforte, Götz for singing, and Reinecke for theory and composition. He was enrolled as a student in the Leipzig Conservatory from 1867 to 1870, after which he studied in Berlin—composition under Kiel, singing under Schulze, and the violin under Schiever. For the next few years he steadily made a reputation for himself as a vocalist of high rank. His first concert in England was early in 1877, and his success was so complete that London became his permanent home, and in 1890 he was legally naturalized. From 1881 to 1884 he was conductor of the Boston Symphony Orchestra, returning to London in 1885. From 1886 to 1888 he was professor of singing at the Royal College of Music, London. After his marriage, in 1881, to Lillian Bailey, a talented American soprano, his appearances in the principal cities of America were in company with his wife. Both artists became famous for their work in Lieder, although they were equally at home in opera and oratorio. His compositions are many, consisting mainly of vocal works and studies, together with a serious opera, *Nubia* (1899), a comic opera, *A Sea Change* (1899), and several works for string and full orchestra. His most important work is the *Stabat Mater* (1899). In 1914 he was knighted.

HENSEL, hén'zel, HEINRICH (c.1880-). A German dramatic tenor, born at Neustadt. He studied with G. Walter and F. Emerich in Milan, making his début at Freiberg in 1897. From 1900 to 1906 he was a member of the Frankfort Opera, after which he went to Wiesbaden. Here S. Wagner heard him and chose him to create the tenor part in his *Banadietrich* (Karlsruhe, 1910). In the summer of the same year he sang Parsifal at Bayreuth. His marked success as a Wagner interpreter led to an engagement at Covent Garden in 1911 and the Metropolitan Opera House in 1912, where he

was regarded as the greatest Siegfried since the days of Alvar. His very extensive repertory includes, besides the Wagner rôles, most of the older standard operas and the works of the modern Italian school.

HENSEL, LUISE (1798-1876). A German devotional poet, sister of Wilhelm Hensel the painter. She was born at Linum and after the death of her father moved with her mother to Berlin (1810), where, seven years afterward, she met Clemens Brentano (q.v.), who fell in love with her. She did not accept his love, but referred him to his church, the Catholic, for consolation, and became a Catholic herself in 1818. In 1819 she was companion to Princess Salm and in 1821 became teacher in the family of the Countess Dowager of Stolberg. From 1833 to 1837 she lived in Berlin again, then at Neuberg, Cologne, and Paderborn. In her first book, *Gedichte* (edited by Kletke, 1858), she collaborated with her sister Wilhelmine. Her evening hymn, *Milde bin ich, geh' zur Ruh*, is one of the finest of German devotional lyrics. Her completed works were edited by Schlüter (8th ed., 1898). Consult Binder, *Luise Hensel* (Freiburg, 1885).—**WILHELMINE HENSEL** (1802-93), sister of Luise, besides the poems published with Luise, wrote another volume, *Gedichte* (1882).

HENSELT, hën'zelt, ADOLF VON (1814-89). A distinguished German pianist, born at Schwabach, Bavaria. The progress he had made in his art, together with the evidences he had given of his genius, led King Ludwig I to grant him an annuity, which made it possible for him to take up study with Hummel at Weimar and Sechter at Vienna. In 1837 he made his formal début as a concert virtuoso and scored a remarkable triumph in the several large cities of Germany in which he appeared. The following year he went to St. Petersburg, where his fame had already preceded him, and where he ultimately reaped his richest rewards. Soon after his arrival there he was appointed court pianist to the Empress and music teacher to the Imperial family, an appointment which was followed by that of inspector of musical instruction at the Imperial Educational Institution for Girls. He was not a prolific composer, but all his compositions are marked with his individuality and depend largely for their interpretation on the style of playing in which Henselt excelled. As a performer, he was remarkable for his sympathetic and poetical interpretation, as well as his mastership of legato execution, and what has since come to be known as singing touch. His compositions include the F minor pianoforte concerto; *Poème d'amour*, op. 3; *Ballade*, op. 31; and several other successful pieces, as well as some extremely difficult extension studies for the practice of a legato execution of extended chords and arpeggios. He died at Warmbrunn, Silesia. Consult La Maru, *Adolf Henselt* (Leipzig, 1911).

HENSEN, hën'zen, VICTOR (1835-). A German physiologist, born in Schleswig. He studied medicine at Würzburg, at Berlin, and at Kiel, where he became docent and later professor of physiology. His earlier studies, under the influence of Bernard, were in embryology and in the physiology and anatomy of the organs of sense; but afterward he devoted himself to marine biology, became a member of the Commission for Scientific Research in German Waters, and contributed largely to the develop-

ment of German fisheries. In 1887 he became a member of the Prussian Landtag, and in 1911 he retired from all active duties. His works include: "Physiologie des Gehörs" and "Physiologie der Zeugung," both in Hermann's *Handbuch der Physiologie* (1880-81); *Reisbeschreibung der Planktonexpedition* (1892); *Die Planktonexpedition und Haeckels Darwinismus* (1891); *Die Entwicklungsmechanik der Nervenbahnen im Embryo der Säugetiere* (1903).

HENSHAW, HENRY WETHERBEE (1850-). An American ornithologist and ethnologist, born at Cambridge, Mass. In 1872-79 he did naturalistic field work in the West, and in 1879-93 he was associated with the Bureau of Ethnology. He studied the biology of the Hawaiian Islands in 1894-1904. He became biologist in 1905 and chief in 1910 of the Biological Survey, United States Department of Agriculture. For a time he was editor of the *American Anthropologist*. His works include: *Animal Carvings from Mounds of the Mississippi Valley* (1883); *Birds of the Hawaiian Islands* (1902), and among other bulletins of the United States Department of Agriculture, *The Mammals of Bitterroot Valley, Mont.* (1911).

HENSHAW, SAMUEL (?-). An American zoölogist. He received the honorary degree of A.M. in 1903 from Harvard University, and there, after serving as assistant entomologist and librarian, he was appointed in 1904 curator of the Museum of Comparative Zoölogy. He became a member of the American Academy of Arts and Sciences, the Torrey Botanical Club, the American Society of Naturalists, and the American Society of Zoölogists. He published a *List of Coleoptera of America, North of Mexico* (1885), with supplements in 1887, 1889, and 1895; and a *Report on the Gypsy Moth of Massachusetts* (1892).

HENSLOW, hën'slô, JOHN STEVENS (1796-1861). An English mineralogist and botanist, born at Rochester. He graduated from St. John's College, Cambridge (B.A., 1818; M.A., 1821). Ordained a priest, in 1824 he became curate of St. Mary the Less at Cambridge. Before this, however, his work in the geology of the Isle of Man and of Anglesea had attracted such favorable notice that in 1822 he had been appointed to the professorship of mineralogy at the university. In 1827 he became professor of botany at Cambridge and shortly afterward gave up his chair of mineralogy. Darwin was one of his favorite pupils, and it was Henslow who recommended him as naturalist for the *Beagle*. He became vicar of Cholsey-cum-Moulsford, Berkshire, in 1832, and rector of Hitcham, Suffolk, in 1837. In 1843 he discovered the valuable beds of phosphatic nodules in the Suffolk Crag. He established the museum at Ipswich in 1847 and was its president after 1850. His publications include: *A Catalogue of British Plants* (1829; 2d ed., 1835); *Principles of Descriptive and Physiological Botany* (1836); *Dictionary of Botanical Terms* (1857; new ed., 1894). Consult the *Memoir* by Leonard Jenyns (1862).

HENSLOWE, PHILIP (?-1616). An English theatrical manager. In the neighborhood of Southwark, where he lived, he owned much property, including the Boar's Head and other inns, and managed and partly or entirely owned several playhouses. He rebuilt the Rose Theatre, managed the Newington Butts and the Swan, and, in company with Edward Alleyn the actor, built the largest London theatre, the Fortune, in

Cripplegate (1600). He also carried on a general brokerage business. He bought plays of the authors and sold them to various acting companies. A diary which he kept of these transactions is a most important document. This and other valuable papers are preserved in the library of Dulwich College. The *Diary*, with some forged entries, was published in 1845 by J. P. Collier for the Shakespeare Society. Consult *Catalogue of MSS. of Dulwich College*, edited by G. F. Warner (London, 1881), and *Henslowe's Diary*, edited by W. W. Gregg (ib., 1904; enlarged, 1908).

HENSON, HERBERT HENSLEY (1863-). An English clergyman and author, born in London and educated at Oxford. He was a fellow of All Souls, Oxford, in 1884-91; head of the Oxford House, Bethnal Green, in 1887-88; select preacher at Oxford in 1895-96 and 1913-14 and at Cambridge in 1901; vicar and rector of several parishes; and canon of Westminster Abbey (1900-12). In 1912 he became dean of Durham. He delivered at Yale University the Lyman Beecher lectures on preaching (*The Liberty of Prophesying*) in 1909 and visited America at other times also. Among his other published works are: *Apostolic Christianity* (1898); *Preaching to the Times* (1903); *Moral Discipline in the Christian Church* (1905); *Westminster Sermons* (1910); *Puritanism in England* (1912); *The Creed in the Pulpit* (1912).

HENSON, JOSIAH (1787-1883). An American Methodist clergyman and lecturer, born a slave in Port Tobacco, Md. His early career is remarkable for the hardships he was forced to endure. He escaped into Canada in 1828 and became a Methodist preacher at Dresden, Ontario. Mrs. Harriet Beecher Stowe met him and drew from the story of his life her character of Uncle Tom. Henson lectured throughout the United States, and made three trips to England during the last years of his life. While upon his final tour in 1876 he was entertained at Windsor Castle by Queen Victoria. He wrote an autobiography (Boston, 1858).

HENSON, POINDEXTER SMITH (1831-1914). An American Baptist clergyman, born in Fluvanna Co., Va., and educated at Richmond (Va.) College (B.A., 1848), and at the University of Virginia (M.A.). Ordained to the Baptist ministry in 1855, his more important pastorates were the Broad Street and Memorial Baptist churches of Philadelphia (1861-82), the First Church, Chicago (1882-1901), the Hanson Place Church, Brooklyn (1901-03), and Tremont Temple, Boston (1903-08). His writings include: *Bible Text Book of Christian Doctrine* (1892); *The Royal Scroll* (1896); *The Four Faces, and Other Sermons* (1902; 2d ed., 1911).

HENSZLMANN, hén's'l-mán, EMERSON (1813-88). An Hungarian art critic and archaeologist, born at Kaschau and educated at Budapest and Vienna. After studying medicine he devoted himself to archaeology and aesthetics and traveled extensively. He took part in the revolution of 1848-49, serving in a department of the Ministry of Foreign Affairs. He was imprisoned for eight months, then left Hungary and lived in London and Paris until 1862, when he returned to his home. He was a member of the Lower House of the Hungarian Diet (1869-72) and professor of the history of art at Budapest (1873-88). A member of the Hungarian Academy and of the National Kisfaludy Society, he wrote: *Théorie des proportions appliquées*

dans l'architecture (1860); *Die nordfranzösische Abtei- und Kathedralekirche* (1865); *Die Grabungen des Erzbischofs von Kalocsa* (1873); and, in Hungarian, on the relation between Greek tragedy and Christian drama (1846), on mediæval architecture (1866), and on the remains of Gothic architecture in Hungary (1880).

HENTY, GEORGE ALFRED (1832-1902). An English author. He was born at Trumpington, Cambridgeshire, and was educated at the Westminster School and at Caius College, Cambridge. He served in the purveyor's department of the British army during the early part of the Crimean War and after returning home invalided was promoted to be purveyor and given service in the Italian Legion. After the close of the war he commanded for a time the Belfast and Portsmouth districts and in 1866 became war correspondent of the *London Standard*. In the service of his paper he accompanied the contestants of the Austro-Italian, Turco-Servian, and Franco-Prussian wars; took part in the Abyssinian expedition of 1868 and the Ashanti expedition of 1873; participated in Garibaldi's Tyrolean campaign; was present at the opening of the Suez Canal in 1869; attended the Prince of Wales during his travels through India; and made an extended tour of the mining regions of the United States. An enthusiastic yachtsman, he spent much of his time afloat, and died on his yacht, Nov. 16, 1902. He is known as the most prolific and popular of contemporary writers for boys, his books being chiefly historical novels. The best known of his novels are: *All but Lost* (1869); *Gabriel Allen* (1888); *Dorothy's Double*; *A Woman of the Commune*; *Colonel Thorndyke's Secret* (1898). Among his books for boys are: *In the Irish Brigade* (1900); *Out with Garibaldi* (1900); *With Buller in Natal* (1900); *At the Point of the Bayonet* (1901); *Malcolm the Water-Boy* (1901); *To Herat and Cabul* (1901); *With Roberts to Pretoria* (1901); *The Treasure of the Incas* (1902); *With the British Legion* (1902); *With Kitchener in the Sudan* (1902).

HENTZ, CAROLINE LEE (1800-56). An American author, born in Lancaster, Mass., a daughter of Gen. John Whiting. At the age of 12 she had produced a novel, a poem, and a tragedy. Her play, *De Lara, or the Moorish Bride*, won a \$500 prize offered by the proprietor of the Arch Street Theatre, Philadelphia. She also wrote many poems and short novels and was especially happy in portraying social conditions in the South. Her novels—and they were numerous—in part aimed to dispel the puerile prejudices entertained by Northerners and Southerners against each other. She wrote, notably: *Aunt Patty's Scrap-Bag* (1846); *The Mob Cap* (1848); *The Planter's Northern Bride* (1854); *Ernest Linwood* (1856).

HENTZ, NICOLAS (1750-1820). A French politician, born at Sierck, where he became justice of the peace. Elected to the Convention in 1792, he voted for the death of the King and became a trusted agent of the Revolution. In 1794, when he returned to Paris from a long series of important missions, in which he had had unlimited powers, he was accused of cruelty in La Vendée and was found guilty; but, benefiting by the amnesty of October, he left public life. The law against the regicides passed in 1816 forced him to leave the country. He escaped to the United States and died on an island in Lake Erie.

HENZEN, hên'tsen, JOHANN HEINRICH WILHELM (1816-87). A German philologist and authority on Latin inscriptions. He was born at Bremen, studied at Bonn, Berlin, and, after travels through France, England, Italy, and Greece, at Rome, where from 1842 to the end of his life he was closely associated with the German Archaeological Institute. With Mommsen and De Rossi he edited for the Berlin Academy the great *Corpus Inscriptionum Latinarum*, in which he personally edited the *Fasti Consulares* to 766 A.U.C. (see FASTI) and the inscriptions of the city of Rome after Cæsar. His other works, besides many contributions to philological journals, to the *Bulletino* and the *Annali* of the archaeological institutes and *Ephemeris Epigraphica*, were a supplementary volume to Orelli's *Inscriptionum Latinarum Collectio* (1856) and *Acta Fratrum Arvalium quæ Supersunt* (1874). Consult *Biographisches Jahrbuch für Alterthumskunde* (Berlin, 1888).

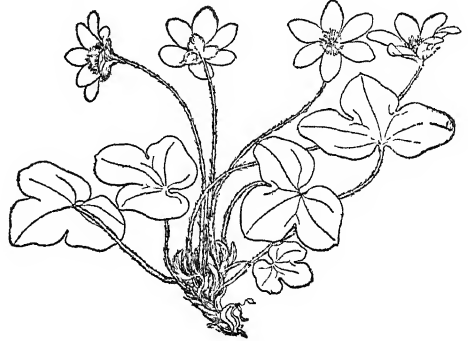
HENZEN, WILHELM (1850-1910). A German dramatist, born in Bremen. He studied music and philosophy at Leipzig, where, save for two years (1874-75) at Munich, he lived after the success of his first play, *Die Kypseliden* (1874). He was connected with the Stadttheater as dramaturgist from 1882 to 1885, and in 1893 became director of the National Association of Dramatic Authors and Composers. Besides the dramas *Lügen des Herzens* (1876), *Ossian* (1877), *Zweideutigkeiten* (1878), *Studiosus Lessing* (1879), *Bettina de Monk* (1881), *Luther* (1883), *Ulrich von Hutten* (1888), *Schiller und Lotte* (1891), *Tod des Tiberius* (1895), *Kaiser, König und Bürger* (1900), *Schiller's Todesfeier* (1905), he wrote the valuable study *Ueber die Traume in der altnordischen Sagalitteratur* (1885-89).

HENZI, or **HENTZI**, hên'tsê, SAMUEL (1701-49). A Swiss patriot, born at Bümplitz (Canton of Bern). After a very comprehensive training he held subordinate posts under the government of the Canton of Bern; in 1741 was appointed a captain in the military service of the Duke of Modena; and in 1744 with others addressed to the Council of Bern a petition for a revision of the constitution. For this he was sentenced to 10 years' banishment, commuted by pardon in 1748. While an assistant librarian at Bern he entered into a conspiracy which had for its object the subversion of the constitution, but which he supposed intended merely a second petition to the cantonal authorities. The undertaking was, however, discovered, and Henzi was executed on July 17, 1749, with two associates. Lessing planned a tragedy based on the fate of Henzi. Consult Bähler, *Samuel Henzis Leben und Schriften* (Aarau, 1880), and Krebs, *Henzi und Lessing* (Bern, 1903).

HEPAR (Lat., from Gk. ἥπαρ, liver). A name given by the older chemists to brown or liver-colored compounds of sulphur. *Hepar antimoni*, called also "liver of antimony," is a mixture of antimony trioxide, potassium sulphide, potassium carbonate, and antimony trisulphide, which has been used in veterinary medicine. *Hepar sulphuris*, called also "liver of sulphur," is a mixture of potassium hyposulphite, potassium sulphide, and potassium pentasulphide, with some potassium carbonate, which has also been used in medicine.

HEPATICÆ, LIVERLEAF (Neo-Lat., from Lat. *hepaticus*, Gk. ἥπατικός, *hēpatikos*, relating to the liver, from ἥπαρ, *hēpar*, liver). A plant

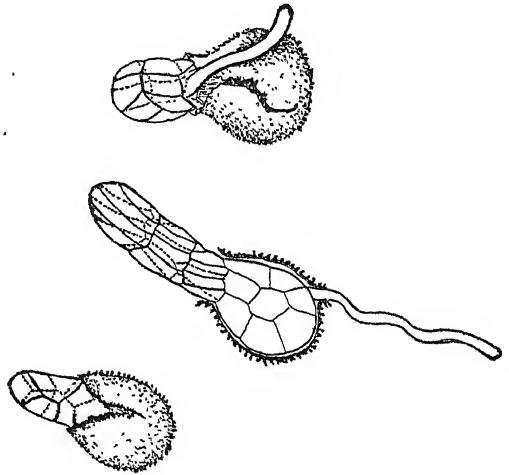
of the genus *Hepatica*, which belongs to the family Ranunculaceæ. The best-known species, *Hepatica triloba*, has showy white, pink, or blue flowers that in earliest spring emerge from a hairy bud which is surrounded by the sombre-



HEPATICÆ.

tinted leaves of the previous year. It is the most beautiful of the early spring flowers of eastern America, and one which by reason of its habitat and mode of blooming furnishes many texts for nature study in elementary schools. The same species is found throughout northern Europe, where it is cultivated and often produces double flowers. The root has powerful astringent properties. Another species, *Hepatica angulosa*, native in Transylvania, is cultivated for the sake of its beautiful pale-blue flowers.

HEPATICÆ (Neo-Lat. nom. pl., from Lat. *hepaticus*, pertaining to the liver). The technical name of the group of plants popularly known as liverworts. The Hepaticæ form one of the two primary subdivisions of Bryophytes (q.v.); the other one includes the mosses. Liverworts grow in a variety of conditions; some float on the water; many live in damp places, and many on the bark of trees, but in general they are mois-



GERMINATION OF SPORES OF CONOCEPHALUS.

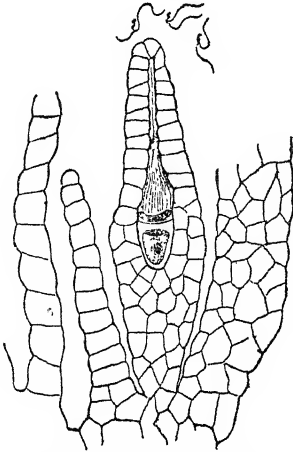
ture-loving plants. The prostrate body consists of what is called a "thallus" (q.v.). By virtue of this position the body is "dorsiventral," since the two surfaces are unlike. The upper (dorsal) surface, exposed to the light, develops structures accordingly; while the under (ventral) surface

is against the substratum and develops rootlike processes as holdfasts and absorbing organs.

There are three well-defined groups of liverworts, each of which represents a special line of

sex organs (antheridia and archegonia) are borne upon different plants.

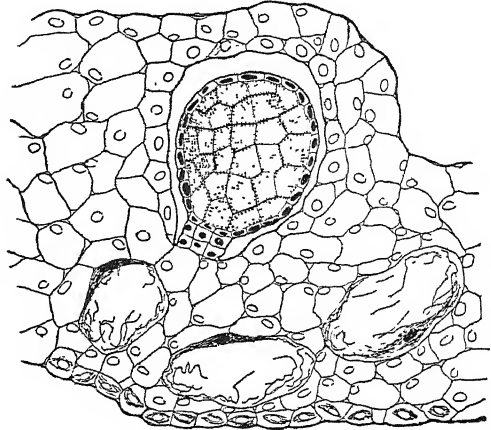
The Jungermanniales include many more species than either of the other orders. These forms often grow in very dry situations, as on rocks, tree trunks, etc., and are often mistaken for delicate mosses. Their resemblance to mosses sug-



ARCHEGONIUM OF PORELLA.

With three sperms approaching the neck.

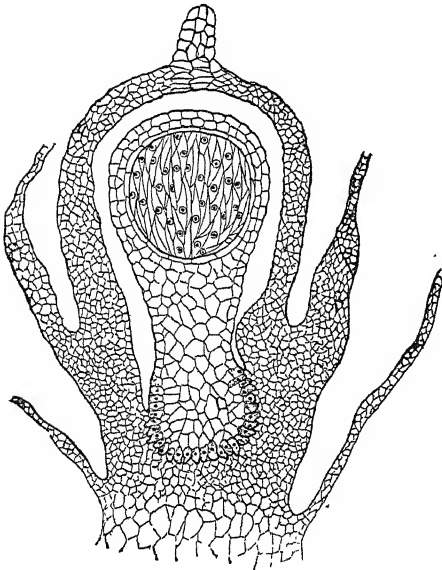
development. In the Marchantiales, the thallus body remains simple in form, like a flat green disk, but becomes thick and rather complex in structure. This thickish body not only produces rootlike processes (rhizoids) from its under surface, but develops reproductive structures from its upper surface. In two genera there is a budding form of reproduction; little cups (cupules) appear often in great numbers in which small disklike bodies (gemmae) are



EMBEDDED ANTHERIDIUM OF ANTHOCEROS.

gests one of the chief features. The prostrate thallus body remains simple in structure, but becomes very much modified in form, being organized into a central stemlike axis which bears two rows of small foliage leaves. As a consequence, the Jungermanniales are usually spoken of as the "leafy liverworts."

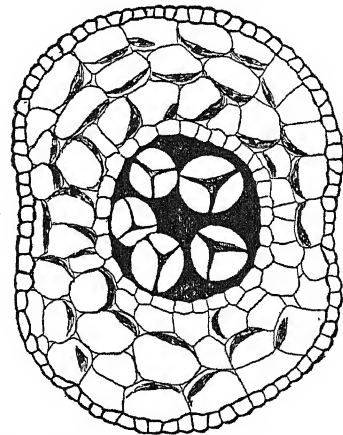
The Anthocerotales comprise comparatively few forms; but these are of great interest, since they are supposed to represent forms which have given rise to the mosses and perhaps to the ferns also. The thallus body is very simple, both in structure and in form, but the chief interest is



VERTICAL SECTION OF SPOROPHYTE OF PORELLA.

Still within the calyptra and showing the globular spore region.

formed. When these gemmae are scattered, they again produce new plants. Upon the upper surface also the sex organs are carried, and in *Marchantia* itself they are borne upon the summit of a conspicuous erect branch. As a rule, the two



CROSS SECTION OF SPOROPHYTE OF ANTHOCEROS.

Showing spores within and surrounded by heavy green tissue.

in connection with the spore case, which is elongated like a slender pea pod, grows continuously in length, is green, and splits into two valves.

The liverworts are thought to have been derived from certain green algæ, and among them alternation of generations (q.v.) is established. The thallus body is the sexual generation (gametophyte, q.v.), since it bears the sex organs. The

fertilized egg produced by these sex organs develops a very different body, viz., the spore case, which is the sexless generation (sporophyte, q.v.). The spores upon germination produce the thallus body or gametophyte again, and so the alternation continues. The structure of the sex organs is also of interest, since they are very different from those of the algae from which the group has come. The male organ (antheridium, q.v.), a many-celled body, consists of a wall of sterile cells within which very numerous sperm-producing cells occur. These sperms, which are of definite structure, have just two motile cilia. The female organ (archegonium, q.v.), which is very characteristic, is a flask-shaped body, within the bulbous base of which a single large egg is formed. How this archegonium of the liverworts has been derived from the far simpler female organs of algae is one of the important botanical problems. In any event it continues to be the characteristic female organ through mosses, ferns, and gymnosperms. See CHLOROPHYCEÆ, and Plate of BRYOPHYTES.

HEPATITIS (Neo-Lat., from Gk. *ἥπαρ*, *hēpar*, liver). Inflammation of the liver. See LIVER, DISEASES OF.

HEPBURN, A (LONZO) BARTON (1846–). An American banker, born at Colton, N. Y. Graduating from Middlebury College in 1871, he taught in preparatory schools, practiced law at Colton, and was a member of the New York Assembly in 1875–80. He served as superintendent of the State Banking Department (1880–83), United States bank examiner for New York (1888–92), and United States Comptroller of the Currency (1892–93). Thereafter engaged in banking in New York City, he was president of the Third National Bank for four years, vice president of the National City Bank for two years, and president of the Chase National Bank from 1899 to 1911, when he became chairman of the board of directors. In 1912 he was appointed Officer of the Legion of Honor of France; and honorary degrees were conferred on him by St. Lawrence and Columbia universities and by Middlebury and Williams colleges. He published a *History of Coinage and Currency in the United States* (1903); *Artificial Waterways and Commercial Development* (1909; new and enlarged ed., as *Panama, Cape Cod, and Other Artificial Waterways*, 1914); *The Story of an Outing* (1913).

HEPBURN, JAMES. See BOTHWELL, JAMES HEPBURN, EARL OF.

HEPBURN, JAMES CURTIS (1815–1911). An American medical missionary and scholar, born at Milton, Pa. He was educated at the College of New Jersey (now Princeton University), where he graduated in 1832. He studied medicine at the University of Pennsylvania, and received his degree of M.D. in 1836. In 1840 he offered his services as a medical missionary to the Presbyterian Board of Foreign Missions, and in the following year he sailed with his wife for Siam. His destination was afterward changed to China, five new ports having been opened there by the Treaty of 1842. He arrived at Amoy, one of the newly opened ports, in 1843 and labored in that field until 1846, when, on account of impaired health, he resigned and returned to New York City. Here he was a successful practitioner until the opening of Japan in 1859, when he again volunteered for service. In that year he went to Yokohama and engaged in such medical and evangelistic

work as could then be carried on in view of the hostile attitude of the government to Christianity. He mastered the language, and in 1867 brought out his Japanese-English and English-Japanese Dictionary, a work of great learning which has remained the standard dictionary until the present day. In 1873 an abridged edition was published in New York. Dr. Hepburn took a leading part in the translation of the Scriptures into Japanese. His medical work included the training of many young Japanese as physicians. In 1892 he published a valuable *Dictionary of the Bible* in Japanese and in the same year retired and made his home in East Orange, N. J. Consult W. L. Griffith, *Hepburn of Japan* (Philadelphia, 1913).

HEPBURN, SIR JOHN (c.1598–1636). A Scottish soldier of fortune, born at Athelstaneford and probably educated at St. Leonard's College, St. Andrews. He fought under Gray in Bohemia (1620) and under Mansfeld in Holland (1622). Subsequently he served in the army of Gustavus Adolphus and entered the French army in 1633. After two years of brilliant fighting in Lorraine and at the sieges of Hagenau and Saverne, he was killed. He was a Catholic and a prime favorite with Richelieu. Consult Grant, *Memoirs and Adventures of Sir John Hepburn* (Edinburgh, 1851).

HEPHÆSTION, hē-fēs'ti-ŏn (Lat., from Gk. *Ἡφαίστιον*, *Hēphæistiŏn*) (c.357–324 B.C.). A Macedonian courtier, known as the friend of Alexander the Great. The two are said to have been companions in childhood; but further than this we do not hear of Hephæstion till 334 B.C., when Alexander visited Troy. Hephæstion is there said to have performed the same service at the grave of Patroclus as Alexander performed at that of Achilles. After that time the two were close friends. In his campaigns Alexander often gave Hephæstion important commissions, such as the founding of colonies and cities and the building of the fleet which was to sail down the Indus, and he rewarded him with a golden crown and the hand of Drypetis, daughter of Darius and sister to his own wife, Statira. When, in 324 B.C., Hephæstion died at Ecbatana, the grief of Alexander was extravagant. He sent to inquire of Jupiter Ammon how he should honor his dead friend and was told to offer sacrifice to him as a hero. The funeral was one of the grandest recorded in history. A funeral pyre was erected at Babylon at a cost of over 10,000 talents, and temples were built in honor of Hephæstion in many places.

HEPHÆSTION. An Alexandrian grammarian of the second century A.D., tutor to the Emperor Verus. He was the author of a work on prosody in 48 books, of which he himself made several abridgments. The manual on metres entitled *Ἐρχειρίδιον Περί Μέρων* (*Encheiridion Peri Metrōn*), which is still extant, is supposed to have been his final abridgment. Though it gives merely a bare sketch of prosody, without any theoretical explanation of the facts, it is of great value; it is the only treatise on Greek prosody preserved complete from antiquity and contains quotations from many lost poets. An incomplete treatise on the different forms of poetry and composition is appended to it. The manual has been edited by Gaisford (Oxford, 1810), by Westphal in his *Scriptores Metrici Græci* (Leipzig, 1866), and by Conbruch (1906). Consult: Conbruch, *De Veterum Περί Ποικίλων Δοctrina* (Breslau, 1890); Goodell,

Chapters on Greek Metric (New York, 1902); Christ-Schmid, *Geschichte der griechischen Literatur* (5th ed., Munich, 1913).

HEPHÆSTUS, hē-fēs'tūs. See VULCAN.

HEPPLEWHITE, GEORGE (?-1786). The furniture fame of the name of Hepplewhite rests mainly on the *Cabinet-maker and Upholsterer's Guide*, published in 1788 "from drawings by A. Hepplewhite & Co., Cabinet-makers"; but George Hepplewhite, the founder and head of the firm whose business was continued by his wife, had already been dead two years, so that the period of Hepplewhite's personal activity considerably antedated that of Sheraton (q.v.), and must have considerably overlapped that of Chippendale (q.v.). Of Hepplewhite's early life we know only that he served his apprenticeship in the Lancaster shop of the Gillows. The contrast between Chippendale furniture and Hepplewhite furniture is extreme. Although Chippendale, towards the end of his career, did construct classic furniture for Robert Adam, most of his work—all that is illustrated in his book—was in the rococo and mixed styles of the early Georgian period. Hepplewhite, on the contrary, represented the purest and simplest, most graceful and most delicate type of classic developed in England in the Adam period. (See INTERIOR DECORATION.) Hepplewhite's appreciation of the great change in styles is indicated in the preface to the *Guide*: "The mutability of all things, but more especially of fashions, has rendered the labors of our predecessors in this line of little use." The most striking characteristics of Hepplewhite chairs, as compared with those of Chippendale, are their smaller size and apparent fragility; backs shield or heart shaped, supported only by the side posts; slender plain, fluted, or reeded legs tapering often to a spade foot; ornament painted or inlaid instead of carved. For bibliography, consult the works cited under SHERATON.

HEPPNER, hēp'nēr. A town and the county seat of Morrow Co., Oreg., 55 miles southeast of Arlington, on the Oregon-Washington Railroad and Navigation Company Line (Map: Oregon, F 2). It is in a productive grain, stock-raising region, the wool product of the county being 2,000,000 pounds in 1914. Pop., 1914 (local est.), 1200.

HEPTAGON (from Gk. ἑπτάγωνος, *heptagōnos*, seven-cornered, from ἑπτά, *hepta*, seven + γωνία, *gōnia*, angle). A plane geometric figure of seven sides. It has especial interest because the regular heptagon cannot be constructed by elementary geometry. See POLYGON.

HEPTAMERON (Gk. ἑπταήμερον, *heptamēron*, from ἑπτά, *hepta*, seven + ἡμέρα, *hēmera*, day). The name of a collection of tales made by several writers at the court of Marguerite de Valois. Le Maçon, at the Queen's behest, translated Boccaccio's *Decameron* in 1545. The *Decameron* inspired the form and other elements of the *Heptameron*. The 10 story-tellers of Boccaccio fled from pest-stricken Florence to a beautiful villa, where 10 stories are told every day for 10 days. In the *Heptameron* five elegant men and women, being caught by a storm at the foot of the Pyrenees, determine to while away the time by having each of the company tell a story every day for 10 days. But Marguerite left only seven days and two stories of the eighth day. The *Joyeux Devis* of Bonaventure des Périers continues the tradition of the old French *fabliaux* and farces, whereas the *Heptam-*

eron, as has been shown, is Italian in genesis and in tone. The body of the work is, like the old *fabliaux*, cynical and often licentious; but the *Heptameron* shows more feeling for natural beauty, and there is an occasional touch of altruistic devotion and even of lyric passion. Thus, the *Heptameron* introduces into French fiction an element of emotional psychology. It makes of a story designed to amuse an instrument of observation and a method of description of human passion. It transfers the interest rarely and tentatively, yet really, from act to motive—bearing witness to the keener psychology that resulted from the Protestant training in controversial dialectics, universal in the court circle of Marguerite, to whom the editing at least of the *Heptameron* is to be attributed. The *Heptameron* was first published in 1558 under the editorship of the Queen's valet de chambre, Claude Crujet. There are many later editions of textual accuracy, and there is a partial and unfaithful English version. There also exists an edition supposedly based on the manuscripts themselves, edited by M. Fred Dillaye (3 vols., Paris, 1879).

HEPTANOMIS. A name given by the Greeks to the interior of Egypt from 30° to 27° N., which comprised nearly all the greatest Egyptian cities and monuments.

HEPTARCHY (from Gk. ἑπτά, *hepta*, seven + ἀρχή, *archē*, kingdom, from ἀρχεῖν, *archein*, to rule). The name formerly given to the kingdoms established by the Angles and Saxons in England. It was believed that there were seven kingdoms, which were contemporaneous and well established, but all that can be safely asserted is that England before the beginning of the ninth century was peopled by various tribes, which were constantly at war with each other, and that sometimes one tribe was conquered and sometimes another. At no time was there a counterpoise of power among seven of them so that they could be said to have a separate, much less an independent, existence. Still, seven names do survive. Occasionally the King who was most powerful for the time being was styled Bretwalda, but in most instances the power of this supposed ruler, beyond the limits of his own territory, must have been very small. The hegemony among the Saxon states generally rested with one of the three great frontier kingdoms, Northumbria, Mercia, and Wessex. The supremacy of Northumbria was established by Edwin (q.v.), who fell in battle against Penda, King of Mercia, in 633. Under Egbert (802-839) Wessex rose to be supreme and virtually swallowed up the others. The following are the seven kingdoms commonly said to have formed the heptarchy: Kent, Sussex, Wessex, Essex, Northumbria, East Anglia, and Mercia. Consult Ramsay, *The Foundations of England*, vol. i (London, 1898), and Green, *The Making of England* (New York, 1881). See ANGLO-SAXONS; also the articles under the seven names mentioned.

HEPTASOPHS, IMPROVED ORDER. A fraternal association in the United States, organized* in 1878, as an offshoot from the Order of Heptasophs (q.v.), from which it differed by the adoption of death benefits as one of its features. The ritual, governing principles, conditions of membership, and methods of business are identical with the original order. In 1914 the order had one supreme conclave and about 780 conclaves, representing a membership of about 75,000. It paid during the last fiscal year \$1,543,168 in death benefits and claimed

to have disbursed since its organization over \$20,000,000.

HEPTASOPHS, ORDER OF. A benevolent fraternal order in the United States, founded in New Orleans in April, 1852, by Alexander Leonard Saunders and several prominent Freemasons. It was originally called the Order of Seven Wise Men, but the title was later changed to the Greek form. The ritual is very elaborate, and much significance is attached to the number seven, the membership in each chapter being either seven or a multiple of that number. After 1872 the adoption of a death-benefit system was agitated, but aroused great opposition, leading in 1878 to the secession of the Zeta Conclave of Baltimore, which organized the Improved Order Heptasophs. (See **HEPTASOPHS**, IMPROVED ORDER.) In 1880 the order finally adopted the benefit feature. Membership is confined exclusively to white male persons, and a belief in the existence of a Supreme Being is required. In 1914 the membership, chiefly in the Southern States, was about 1000.

HEPTATEUCH, hēp'tā-tūk (from Gk. ἑπτὰ, *hepta*, seven + *teuchos*, *teuchos*, tool, book). A word formed on the analogy of Pentateuch, meaning the first seven books of the Bible. It is applied to an abridgment and translation of these books, with the Book of Job, into Anglo-Saxon, made by Ælfric the Grammarian (q.v.) in the tenth century. There are copies of it in the British Museum and the Bodleian Library. It was first printed in 1698 by Edward Thwaites and is in C. W. M. Grein's *Bibliothek der angelsächsischen Prosa*, vol. i (Göttingen, 1872). The name is also used for a Latin hexameter version, probably by Cyprianus, of the sixth century, edited by Mayor (Cambridge, 1889).

HEP'WORTH, GEORGE HUGHES (1833-1902). An American clergyman and journalist. He was born in Boston, graduated at Harvard Divinity School in 1855, and entered the Unitarian ministry at Nantucket, Mass. He was pastor of the church of the Unity, Boston, from 1858 to 1870, meantime serving as a chaplain in the Union army on the staff of General Banks. In 1870 he took charge of the church of the Messiah in New York; but he resigned within two years, entered the Congregational church, and soon afterward established (in New York) the church of the Disciples. He resigned this charge in 1878 and went abroad for rest. He preached at the Belleville Avenue Congregational Church in Newark, N. J., from 1882 until 1885, when he became connected editorially with the New York *Herald* and *Evening Telegram*, in which he published a series of brief religious writings, later published as *Herald Sermons*. He had charge of a famine relief fund for Ireland in 1880 and later investigated the condition of the Armenian Christians. Among his writings are: *Whip, Hoe, and Sword* (1864); *Rocks and Shoals* (1870); *Hiram Golf's Religion* (1892); *Brown Studies* (1895); *The Farmer and the Lord* (1896); *Through Armenia on Horseback* (1898). Consult his Life by Ward (New York, 1903).

HERA. See JUNO.

HERACLEA, hēr'ā-klē'ā (Lat., from Gk. Ἡράκλεια, *Hērakleia*, from Ἡρακλῆς, *Hēraklēs*, Hercules). The name of a number of Greek towns in both Europe and Asia. Of these the most important were: 1. Heraclea in Lucania, near the Gulf of Tarentum, not far from the modern Policoro. It was founded in 432 B.C. by Tarentines and Thurians, and the inhabitants of

the earlier colony Siris, which continued to exist only as its port. In a fertile territory it seems to have enjoyed great prosperity, but in dependence upon Tarentum. In 280 B.C. the first great battle between Pyrrhus (q.v.) and the Romans was fought near by, and two years later the Romans concluded with Heraclea a treaty of alliance on very favorable terms. It was still a flourishing place in the time of Cicero, but later fell into decay and is now a heap of ruins. Near the ancient site were found in 1732 and later two bronze tablets, the *Tabulae Heracleenses*, containing on one side a long Greek inscription of the fourth or the third century B.C. relating to certain sacred lands of Dionysus and Athena, whose boundaries had been disturbed in a recent war, and on the other a much more important Latin document, the *Lex Iulia Municipalis* (45 B.C.), which is one of the chief authorities for the municipal law of Italy. These inscriptions have often been published, but may best be found in Kaibel, *Inscriptiones Graeciae, Siciliae et Italiae*, 645 (Berlin, 1890); *Corpus Inscriptionum Latinarum*, i (Berlin, 1863); Hardy, *Six Roman Laws Translated with Introduction and Notes* (Oxford, 1911).

2. Heraclea Minoa, on the south coast of Sicily, west of Agrigentum. The city seems to have been originally established by Selinus, but about 510 B.C. it was occupied by Spartans under the leadership of Euryleon. The name "Minoa" was due to a legend attributing the founding of the city to Minos of Crete. In the fifth century it was at various times under the control of the Greeks and of the Carthaginians. About 383 it passed finally under the Carthaginian power. It was afterward destroyed by the Carthaginians, though a small settlement continued to exist under Carthaginian rule, and after 314 B.C. rose to renewed importance and was one of the chief Carthaginian naval stations during the First Punic War. The site, on Cape Bianco, is now wholly deserted, and but few traces of the ancient city are visible.

3. Heraclea Pontica, a Megarian colony on the south coast of the Black Sea, the modern *Eregli* (q.v.). It seems to have been founded about the middle of the sixth century B.C. After a period of party strife it passed under the rule of a moderate oligarchy, which soon made it master of the neighboring territory including some of the lesser Greek colonies. Even when the aristocracy was supplanted by a tyrant, the prosperity of the city continued to increase; but after the overthrow of the Persian Empire by Alexander the growth of the Bithynian power and the wars with the Galatians lessened its influence. It was plundered by the Romans in the Mithridatic war and from that time gradually declined. It was the birthplace of the philosopher Heraclides Ponticus (q.v.). See also CHION.

HERACLEENSES TABULÆ. See HERACLEA, 1.

HER'ACLE'ON (Lat., from Gk. Ἡρακλέων, *Hēraklēōn*). A Gnostic Christian, who flourished in Italy during the third quarter of the second century. Clement of Alexandria calls him the most distinguished follower of Valentinus (q.v.). His writings survive only in fragments, and each quotation is accompanied by unfriendly comments by his orthodox opponent. He wrote a Gospel commentary, entitled *Hypomnemata*, which dealt especially with St. John. Origen preserves considerable fragments of this work in his own commentary on the same Gospel.

Clement also quotes from Heracleon, but we are not certain that it is from this work. Hippolytus says that Heracleon and other Western Valentines taught that Christ's body was of animal substance, while the Oriental school regarded it as spiritual. But we know little about the details of their systems. Heracleon's influence was sufficient to perpetuate his name among his followers, who are called Heracleonites. Consult Brooke, *The Fragments of Heracleon* (Cambridge, 1901). See Gnosticism.

HERACLEONAS (Lat., from Gk. Ἡρακλειῶνας, *Hērakleīōnas*) (c.614-?). An Emperor of Byzantium, son of the Emperor Heraclius. He fought with his father in Syria and was appointed Cæsar in 638 or 639. When his father died (641), his mother, Martina, asked that he be permitted to rule with his invalid stepbrother, Constantine III. But Constantine died after a reign of less than five months and Heracleonas became sole Emperor. The Senate suspected that Martina had had this in view, and had possibly hurried the death of her stepson; a revolution broke out; Heracleonas was dethroned, his nose cut off, his mother's tongue torn out, and the two were exiled to Constantinople. Constans II, son of Constantine, succeeded to the throne.

HERACLEONITES. See HERACLEON.

HERACLEOPOLIS (Lat., from Gk. Ἡρακλέους πόλις, *Hērakleous polis*, city of Hercules). A city of ancient Egypt, on the right bank of the Bahr Yūsuf (Joseph's Canal), about 10 miles west of the Nile. It was called by the Egyptians Hēnen-suten, whence its Coptic name Hnēs, and its modern Arabic name Ahnas and Henassīye. Heracleopolis was the seat of worship of the ram-headed god Hershef, whom the Greeks identified with Heracles. Of the temples and other buildings, for which the place was renowned in ancient times, scarcely anything remains. An extensive necropolis lies upon the opposite bank of the Bahr Yūsuf. Consult Naville, *Ahnas el Medīneh*, Egyptian Exploration Fund, vol. xi (London, 1891).

HERACLES. See HERCULES.

HERACLEUM, hēr'ā-klē'ūm. See CANDIA.

HERACLEUM. See COW PARSNIP.

HERACLI'AN (?-413 A.D.). A Roman general. At the instance of the Emperor Honorius, he put Stilicho (q.v.) to death (408 A.D.) and received the Government of Africa as his reward. After supporting the Emperor during the invasion of Alaric and the usurpation of Attalus, whom Alaric had made Emperor, Heraclian revolted and invaded Italy. His enterprise failed, however, and on his return to Carthage he was put to death by order of Honorius. Consult *The Cambridge Mediæval History*, vol. i (New York, 1911).

HERACLIDÆ, hēr'ā-klī'dē (Lat., from Gk. Ἡρακλῆιδαι, *Hērakleidai*, descendants of Hercules, from Ἡρακλῆς, *Hēraklēs*, Hercules). 1. The name is applied specifically to those legendary descendants of Heracles who were said to have led the Dorians (q.v.) in the conquest of the Peloponnesus. The legend told of an unsuccessful attempt by Hyllus, eldest son of Heracles by Deianira, to recover the inheritance from which Eurystheus (q.v.) had driven him, and then of a successful invasion, 100 years later, led by his great-grandsons Temenus, Cresphontes, and Aristodemus, sons of Aristomachus, with the aid of Oxylus, an Ætolian. They defeated Tisamenus, son of Orestes and grandson of Agamemnon, and gained possession of the Peloponnesus.

Argos fell to Temenus; Lacedæmon to Procles and Eurystheus, the sons of Aristodemus; Messenia to Cresphontes; Elis to the Ætolian Oxylus; Arcadia alone remained undisturbed. This story of the return of the Heraclidæ seems to owe its development to the epic rather than to popular tradition, and is an attempt to explain the change from the conditions of the Homeric poems to those of the period after the Dorian conquest. The invasions are not named in Homer or in Hesiod, but the poems of Tyrtæus show the general acceptance of the stories about the Heraclidæ in Sparta about 650 B.C. It is the later legendary account of the Dorian conquest, which from its nature must in reality have been a much more obstinate and protracted struggle. The legends of the Heraclidæ represent, it is held, a joint invasion of the Peloponnesus by Dorians and Ætolians, when the Dorians were driven southward from their northern abode by the Thessalians. Consult the histories of Greece by Thirlwall, Grote (older views), Holm, and Busolt, and especially Meyer, *Geschichte des Altertums*, ii (Stuttgart, 1893).

2. A tragedy by Euripides, brought out about 420 B.C. It tells of the persecution of the sons of the dead Heracles by Eurystheus and their reception and protection by Athens. The children of Heracles, under the leadership of Iolaus, come to Marathon, and the Athenians gain a victory over the Argives through the voluntary sacrifice of Macaria, daughter of Heracles. Eurystheus is taken prisoner and surrendered to Alcmena, who demands his death. The play was meant to represent to Sparta how unnatural would be her contemplated alliance with Argos during the Peloponnesian War, and was directed against the Argive party in Athens.

HERACLIDES LEMBOS. See HERACLIDES PONTICUS.

HERACLI'DES PONTICUS (Lat., from Gk. Ἡρακλῆδης, *Hērakleidēs*, and *Pontus*). A Greek philosopher of the fourth century B.C., born at Heraclea Pontica. At Athens he became a disciple of Plato, whom he represented during the latter's absence in Sicily. Later, however, he attached himself to Aristotle. His numerous writings covered many fields, including philosophy, grammar, music, physics, rhetoric, political and literary history, and geography. Critical and philosophical ability were apparently not possessed by him in a high degree, for his philosophical works were early neglected. His biographical and grammatical treatises, however, long enjoyed popularity. Diogenes Laërtius praises his style, while Cicero blames him for his fondness for marvelous tales. The extracts, *On Constitutions*, which bear the name of Heraclides, are only a poor compilation from Aristotle's *Politics* and should be attributed to Heraclides Lembos (second century B.C.). This work was edited by Schneidewin (Göttingen, 1847), and by Kaibel and Wilamowitz, as an appendix to their edition of Aristotle's *Constitution of Athens* (Berlin, 1898). The fragments of Heraclides' writings were collected by Müller, *Fragmenta Historicorum Græcorum*, vol. ii (Paris, 1848). Consult: Voss, *De Heraclidis Pontici Vita et Scriptis* (Leipzig, 1896); Schmidt, *De Heraclidæ Pontici et Dicæarchi Messenii Dialogis Deperditis* (Breslau, 1867); Ueberweg, *Grundriss der Geschichte der Philosophie*, edited by Prächter, vol. i (10th ed., Berlin, 1909); Gomperz, *Greek Thinkers*, vol. iv (Eng. trans., New York, 1912).

HERACLITUS (Lat., from Gk. Ἡράκλειτος, *Hērakleitos*). A Greek philosopher who flourished about 500 B.C., born at Ephesus in Asia Minor. From the obscurity of his writings he was nicknamed "The Dark" (ὁ σκοτεινός). Only one work, that *On Nature*, can be attributed to him. Of this, numerous fragments are preserved by later writers. Heraclitus' philosophy was a development of the Ionic doctrine under the influence of Xenophanes. The principle of all things according to him was fire—a self-determined ether which by condensation and rarefaction creates the phenomena of the sensible world. To the "being" of his predecessors he added the principle of "becoming." He held that all things are in constant flux, and that the appearance of stability is due to the uniformity of motion. His philosophy had a strong influence on later thinkers; Zeno recalled it, and Stoicism was based on its teaching. The fragments of his work are to be found in Mullach, *Fragmenta Philosophorum Græcorum*, vol. i (Paris, 1860); Bywater, *Heracliti Ephesii Reliquiæ* (Oxford, 1877); Ritter and Preller, *Historia Philosophiæ Græcæ* (9th ed., Gotha, 1913). Consult: Zeller, *Philosophie der Griechen*, vol. i (5th ed., Leipzig, 1892); Patricke, *The Fragments of the Work of Heraclitus* (Baltimore, 1889); Fairbanks, *The First Philosophers of Greece* (New York, 1898); Diels, *Heraclit von Ephesus*, with German translation (2d ed., Berlin, 1909); Gomperz, *Greek Thinkers*, vol. i (Eng. trans., New York, 1905); Ueberweg, *Grundriss der Geschichte der Philosophie*, edited by Prüchter, vol. i (10th ed., Berlin, 1909).

HERACLIUS, hēr-à-kli'ūs (c.575–641). Byzantine Emperor from 610 to 641. He was a native of Cappadocia and belonged to a distinguished family, his father having been Exarch of Africa. In 610, when the tyranny of the Emperor Phocas had become unbearable, and the mother and bride to be of Heraclius himself were imprisoned, he equipped a fleet in Africa and appeared before Constantinople. The citizens rose in rebellion, Phocas was beheaded, and Heraclius became Emperor in his stead. The condition of the Byzantine Empire at this time was deplorable. Years elapsed before Heraclius could put forth any vigorous efforts for its reorganization. In 619 the Avars plundered the country to the gates of Constantinople and carried off an immense number of captives. In the East the conquests of the Persians threatened the very existence of the Empire. Jerusalem was stormed by the generals of Khosru in 615, and Egypt was overrun in the following year. The stopping of the export of corn from Egypt to Constantinople caused a severe famine in the capital. The Emperor, however, was meanwhile disciplining and equipping an army for the invasion of Persia, and in 622 he took the field. In the plain of Issus he routed a Persian army and forced his way through the passes of the Taurus and Anti-Taurus, into the ancient Pontus, where his soldiers wintered. In 624 he crossed Armenia, conquered several of the Perso-Caucasian countries, and reached the Caspian Sea. There he formed an alliance with the Khazars, and with their assistance attacked Media and carried his arms as far south as Ispahan. Before going into winter quarters he defeated the main body of the Persians, commanded by Khosru himself. In 625 Heraclius descended from the Caucasus into Mesopotamia and thence proceeded into Cilicia, where he routed the Persians once more with immense slaughter. During the next two years

(626–628) Heraclius carried the war into the heart of the Persian Empire, and in December, 627, cut to pieces the forces of Rhazates, the Persian general, near the junction of the Little Zab and the Tigris. An immense booty fell into the hands of the victors. Khosru fled into the interior of Persia and was soon afterward put to death by his son Siroes, who concluded a peace with Heraclius, by which the Persians gave up all their former conquests (628). Not the least of the trophies Heraclius brought back to Constantinople was the alleged wood of the true cross, which the Persians had carried off from Jerusalem in 615. The fame of Heraclius was now at its height, but the rise of the Mohammedan power in Arabia brought a new and terrible enemy against the old Empire, where religious dissensions still created bitter factions, whose strife weakened the state. Heraclius seems to have exhausted his splendid energies and ambition in the remarkable Persian campaigns and now spent his time in his palace at Constantinople, partly in sensual pleasures and partly in theological disputations. In his efforts to mediate between the orthodox party and the Monophysites (q.v.) Heraclius sought to impose the Monothelite doctrine on the Empire, arousing thereby great disturbances in the capital. (See MONOTHELITISM.) Before the close of his life Syria, Palestine, Mesopotamia, and Egypt were in the hands of the caliphs. He died Feb. 11, 641. Consult: Bury, *A History of the Later Roman Empire from Arcadius to Irene*, vol. ii (London, 1889); Finlay, *History of Greece* (Oxford, 1877); Gibbon, *Decline and Fall of the Roman Empire*, edited by Bury, vol. v (London, 1898); Drapeyron, *L'Empereur Héraclius et l'empire byzantin au VII^{ème} siècle* (Paris, 1860), with bibliographical notes. There is also a contemporary account by Sepeos, an Armenian bishop, that was published in Constantinople in 1850. See BYZANTINE EMPIRE.

HERACLIUS, à'rà'klé-ūs'. A minor tragedy by Corneille (1647).

HERÆUM (Lat., from Gk. Ἡραῖον, *Hērāion*), THE ARGIVE. The oldest and most noted sanctuary of Argolis, and the chief seat in Greece of the worship of Hera, situated on a spur of Mount Eubœa, between Argos and Mycenæ. The original temple was burned in 423 B.C., and a new one built with great magnificence, under direction of the architect Eupolemos of Argos. Of the second building Pausanias gives a detailed description. It contained two images of the goddess—one of wood, brought from Tiryns, and a statue of gold and ivory by Polyclitus. A few remains of the sculptures are preserved at Athens. The site of the Heræum has been excavated by the American School of Classical Studies (1891–95). Consult: Waldstein, *Excavations at the Heræon of Argos* (Boston, 1892); id., *Argive Heræum* (2 vols., ib., 1902–05); Baedeker, *Greece* (4th Eng. ed., Leipzig, 1909; contains a plan).

HERAKLEION. See CANDIA, MEGALOKASTRO.

HERALD (from OF. *heralt*, *heraut*, Fr. *héralut*, from ML. *heraldus*, *haraldus*, herald, from OHG. *hari*, *heri*, Ger. *Heer*, AS. *here*, army + OHG. *-walto*, AS. *-wealda*, power, from OHG. *waltan*, Ger. *walten*, AS. *wealdan*, Eng. *wield*). In England, an officer whose duty consists in the regulation of armorial bearings, the marshaling of processions, and the superintendence of certain public ceremonies. There were heralds in Greece as early as in Homeric times, who sum-

moned the assemblies, proclaimed war and peace, and had various other functions. In Rome some matters of war and peace were intrusted to *fetiales*, who proclaimed war, officiated in treaties of peace, etc. In the Middle Ages heralds were highly honored and enjoyed important privileges; their functions included, in addition to those mentioned, the bearing of messages, whether of courtesy or defiance, between royal or knightly personages; the superintending and registering of trials by battle, tournaments, jousts, and all chivalric exercises; the computation of the slain after battle; and the recording of the valiant acts of the fallen or surviving combatants. The person of a herald, while in the exercise of his duties, was inviolable. The word *heraldus* was used in Germany as early as 1152; the first use in an English document occurs in 1337. The heralds became very influential in the latter half of the fourteenth century. The Herald's College (q.v.) was incorporated in 1483. Three orders of officials—kings-at-arms, heralds, and pursuivants—are still appointed. There are now in England four kings-at-arms, named by their offices Garter, Clarenceux, Norroy, and Bath; six heralds—Somerset, Chester, Windsor, Richmond, Lancaster, and York; and four pursuivants—Rouge Dragon, Portcullis, Blue Mantle, and Rouge Croix. In Scotland there are at present three heralds—Albany, Ross, and Rothesay—and three pursuivants—Carrick, March, and Unicorn—the principal heraldic officer being Lyon King-at-Arms. Ireland has one king-at-arms, Ulster; two heralds, Cork and Dublin; and four pursuivants, Athlone and St. Patrick I, II, III. The official costume of a herald consists of a satin tabard or surcoat embroidered with the royal arms, and a collar of SS. See HERALDS' COLLEGE; KING-AT-ARMS; PURSUIVANT; SS, COLLAR OF.

HERALDRY. Properly, the knowledge of the multifarious duties devolving on a herald (see HERALD); in the more restricted sense, in which it will be considered here, it is the science of armorial bearings.

History. Though there are many instances in remote times of nations and individuals distinguishing themselves by particular emblems or ensigns, nothing that can properly be called armorial bearings existed much before the middle of the twelfth century. The shield of the French knights in the First Crusade presented a plain face of polished metal, and there were only a very few heraldic devices in use by the time of the Second Crusade in 1147. The Anglo-Norman poet Wace, who wrote in the latter half of the twelfth century, mentions devices or cognizances as being in use among the Normans, at the conquest of England, and Wace is corroborated by the Bayeux tapestry of the twelfth century, where there are figures of animals on the shields of the invaders, while the Saxon shields have only borders or crosses. The rude devices on these shields have nothing approaching to an armorial form or disposition, and in some cases the same device is represented on different shields, and the same knight is depicted with different devices in different groups of the tapestry. Heraldry probably developed during the Crusades, where it was necessary for a knight to have some mark by which he might be known; it may have been influenced by the Saracen custom of wearing richly embroidered devices. Some armorial insignia were depicted on the shields used in the Third Crusade, which

took place in 1189 and the following years; and in the same half century originated the *flurs-de-lis* of France and the lions or leopards of England. The transmission of arms from father to son seems to have been fully recognized in the thirteenth century, and in the practice then introduced of embroidering the family insignia on the surcoat, worn over the hauberk or coat of mail, originated the expression *coat of arms*. Arms were similarly embroidered on the jupon, cyclas, and tabard, which succeeded the surcoat—a practice which survived till the time of Henry VIII, when the tabard came to be entirely disused except by heralds, who still continue to wear on their tabards the royal arms.

It was by slow degrees that the usage of arms grew up into the systematized form which it assumes in the works of the established writers on heraldry. The principal existing data for tracing its progress are English rolls of arms yet extant of the times of Henry III, Edward I, and Edward III. The earliest formal treatises date no farther back than the end of the fourteenth century, before which time the whole historical part of the subject had been obscured by a tissue of gratuitous fiction, which has misled most subsequent writers up to a very recent period. The writers on the subject represented the heraldry of the tenth and eleventh centuries as equally sharply defined with that of the fifteenth and sixteenth. The arms of William the Conqueror and his sons are described with all their differences; arms are ascribed to the Saxon kings of England, to Charlemagne, to biblical characters, and even to half-mythical persons and heroes of classical times.

In the infancy of heraldry every knight assumed what arms he pleased, without consulting sovereign or king-at-arms. Animals, plants, imaginary monsters, things artificial, and objects familiar to pilgrims were all fixed on. Thus, the scallop shell, the emblem of St. James and most generally in heraldry called a "clam," was frequently borne by Crusaders. Often the object chosen was one whose name bore sufficient resemblance in sound to suggest the name or title of the bearer of it. Devices and mottoes were sometimes chosen on account of their allusive associations: e.g., a broken spear for *Brake-speare*, or *Festina lente* for the Onslows. This is called *Canting Heraldry* by the English, *Armes parlantes* by the French. The charge fixed on was used with great latitude, singly or repeated, in any way which the bearer chose, or the form of his shield suggested. But, as coats of arms became more numerous, confusion often arose from different knights adopting the same symbol; and this confusion was increased by a practice which crept in of sovereigns or feudal chiefs allowing their arms, or part of them, to be borne as a mark of honor by their favorite followers in battle. Hence different coats of arms came in many instances so closely to resemble each other that it was imperative, for distinction's sake, that the fancy of the bearer should be restrained, and regulations laid down regarding the number and position of the charges, and the attitudes of the animals represented. This necessity led, in the course of time, to the systematizing of heraldry—a process which the rolls alluded to show us was going on gradually throughout the thirteenth and fourteenth centuries. By the time that heraldry was consolidated into a science, its true origin had been lost sight of, and the credulity and fertil-

ity of imagination of the heralds led them to invest the most common charges with mystical meanings, and to trace their original adoption to the desire of commemorating the adventures or achievements of the founders of the families who bore them. It was only when heraldry began to assume the dignity of a science that augmentations of a commemorative character were granted. After the science became thoroughly systematized, augmentations and new coats were often granted with a reference to the supposed symbolical meanings of the charges.

In England the assumption of arms by private persons was first restrained by a proclamation of Henry V, prohibiting their assumption by any one who had not borne arms at Agincourt, except in virtue of inheritance or a grant from the crown. To enforce the observance of this rule, heralds' visitations or processions through the counties were instituted and continued from time to time till the reign of William and Mary.

Jurisdiction in questions of arms is executed by the Herald's College (q.v.) in England, the Lyon Court in Scotland, and the College of Arms in Ireland. No one within the United Kingdom is entitled to bear arms without an hereditary claim by descent or a grant from the competent authority; and the wrongful assumption of arms is an act for which the assumer may be subjected to penalties. The use of arms, whether rightfully or wrongfully, subjects the bearer of them to an annual tax. It is illegal to use without authority not only a coat of arms, but even a crest. Any figure or device placed on an heraldic wreath is considered a crest in questions with the Herald's College or Lyon Court.

Classification. Besides individuals, communities and states are entitled to the use of arms, and heralds have classified arms, in respect of the right to bear them, under the following 10 heads: 1. Arms of dominion; the arms borne by sovereigns as annexed to their territories. 2. Arms of pretension, which sovereigns have borne who, though not in possession, claim a right to the territories to which the arms belong. Thus, England bore the arms of France from the time of Edward III till 1801. 3. Arms of community; the arms of bishops' sees, abbeys, universities, towns, and corporations. 4. Arms of assumption; arms which one has a right to assume with the approbation of the sovereign. Thus, it is said, the arms of a prisoner of war may be borne by his captor and transmitted by him to his heirs. 5. Arms of patronage, added by governors of provinces, lords of the manor, patrons of benefices, etc., to their family arms, as a token of superiority, right, or jurisdiction. 6. Arms of succession, borne quartered with the family arms by those who inherit fiefs or manors, either by will, entail, or donation. Thus, the dukes of Athole, as having been lords of the Isle of Man, quarter the arms of that island, and the Duke of Argyll quarters the arms of the Lordship of Lorne. 7. Arms of alliance, taken up by the issue of heiresses, to show their maternal descent. 8. Arms of adoption, borne by a stranger in blood, to fulfill the will of a testator. The last of a family may adopt a stranger to bear his name and arms and possess his estate. Arms of adoption can only be borne with permission of a sovereign or king-at-arms. 9. Arms of concession; augmentations granted by a sovereign of part of his royal arms, as a mark of distinction—a usage which, we

have already observed, obtained in the earliest days of heraldry; and hence the prevalence among armorial bearings of the lion, the fleur-de-lis, and the eagle, the bearings of the sovereigns of England and Scotland, of France, and of Germany. 10. Paternal or hereditary arms, transmitted by the first possessor to his descendants.

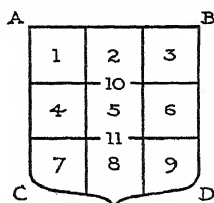
The Escutcheon. A coat of arms is composed of charges depicted on an escutcheon representing the old knightly shield. The shields in use in England and France in the eleventh and twelfth centuries were in shape not unlike a kite—a form which seems to have been borrowed from the Sicilians; but when they became the recipients of armorial bearings, they were gradually flattened and shortened. From the time of Henry III the escutcheon has been most frequently represented on seals as approaching a triangular form, with the point downward, the chief exceptions being that the shield of a lady is lozenge-shaped and of a knight banneret square. To facilitate description, the surface or field of the escutcheon has been divided into nine points, technically distinguished by the following names: A, the dexter chief point; B, the middle chief; C, the sinister chief; D, the honor or collar point; E, the fess point; F, the nombril or navel point; G, the dexter base point; H, the middle base; and I, the sinister base point. It will be observed that the dexter and sinister sides of the shield are so called from their position in relation, not to the eye of the spectator, but to the supposed bearer of the shield.

Tinctures. Coats of arms are distinguished from one another, not only by the charges or objects borne on them, but by the color of these charges and of the field on which they are placed. The field may be of one color or of more than one, divided by a partition line or lines varying in form. The first thing, then, to be mentioned in blazoning a shield—i.e., describing it in technical language—is the color, or, as it is heraldically called, *tincture*, of the field. (See Illustration, *Tinctures*.) Tinctures are either of metal, color strictly so called, or fur. The metals used in heraldry are two—gold, termed *or*, and silver, *argent*—represented in painting by yellow and white. The colors are five—red, blue, black, green, and purple, known as *gules*, *azure*, *sable*, *vert*, and *purpure*. Two other colors have been used occasionally—*tawny*, or *tenné*, and *murrey*, or *sanguiné*. But these are now discarded in most countries. Metals and colors are indicated in uncolored heraldic engravings by points and hatched lines—an invention formerly ascribed to Silvestro di Petrasancta, an Italian herald of the seventeenth century—but a chart from the Duchy of Brabant published in 1600 had the tinctures so indicated. *Or* is represented by small dots; for *argent* the field is left plain. *Gules* is denoted by perpendicular, and *azure* by horizontal, lines; *sable*, by lines perpendicular and horizontal crossing each other; *vert*, by diagonal lines from dexter chief to sinister base; *purpure* by diagonal lines from sinister chief to dexter base; *murrey*, by a combination of vert and purpure; *tawny*, by a combination of vert and gules. The last two are little used. The *furs* were originally but two, *ermine* and *vair*. The former is represented by black spots or tails on a white ground. *Vair*, said to have been taken from the fur of a squirrel, bluish gray on the back and

HERALDRY

DIVISIONS of

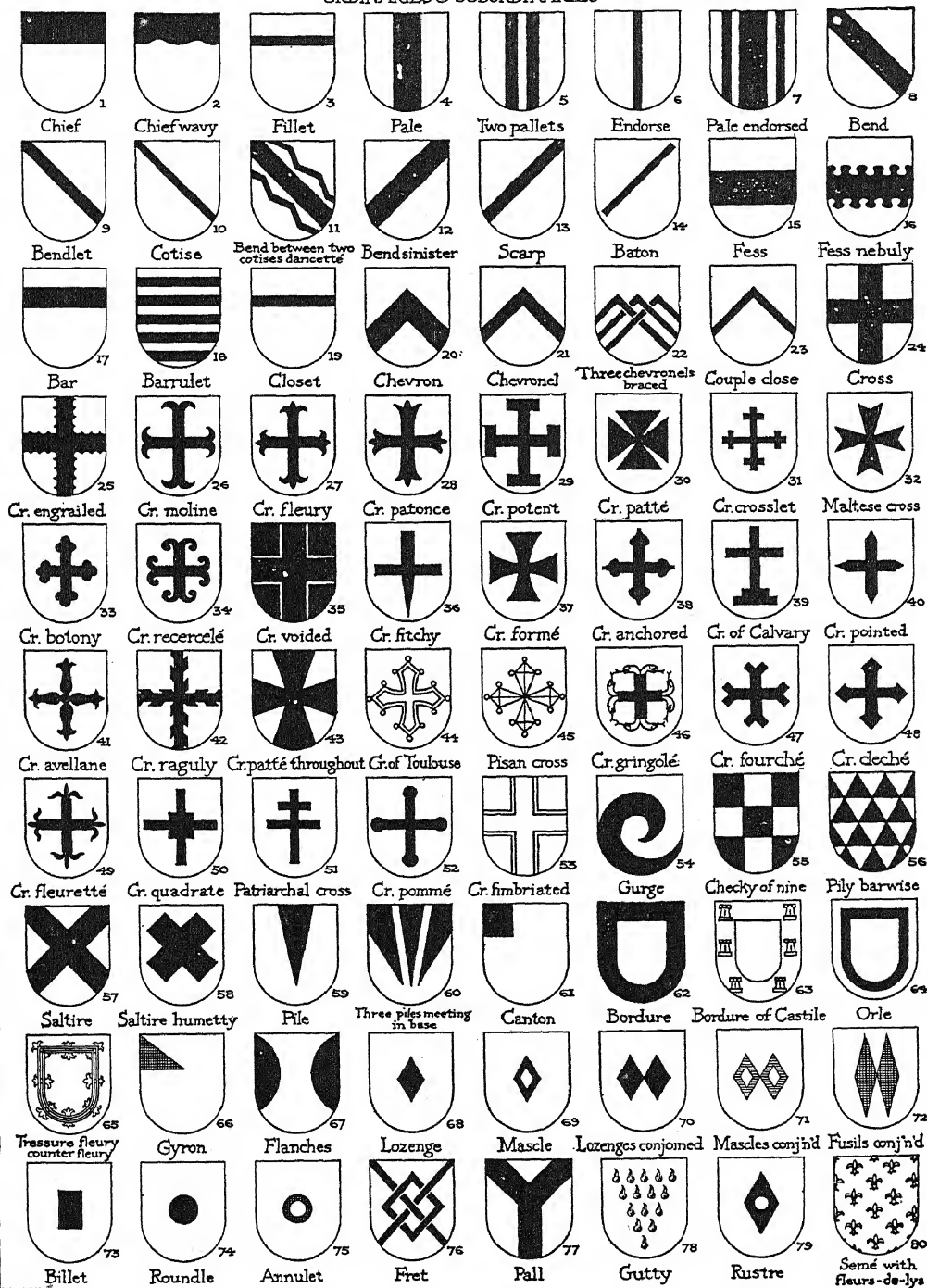
- AB Upper margin
- CD Lower margin
- AC Dexter margin
- BD Sinister margin
- 123 Chief
- 456 Fess
- 789 Base
- 147 Dexter tierce
- 258 Pale
- 369 Sinister tierce



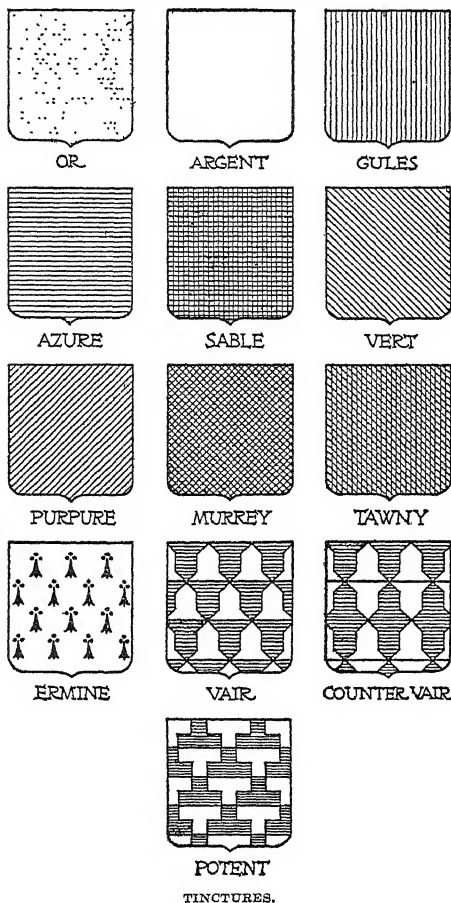
the SHIELD

- 1 Dexter chief canton
- 2 Chief point
- 3 Sinister chief canton
- 4 Dexter flank
- 5 Center point
- 6 Sinister flank
- 7 Dexter canton of base
- 8 Base point
- 9 Sinister canton of base
- 10 Honor point
- 11 Nombril point

ORDINARIES & SUBORDINARIES



white on the belly, is expressed by blue and white shields, or bells in horizontal rows, the bases of the white resting on the bases of the blue. If the vair is of any other colors than white and blue, they must be specified. Various modifications of these furs were afterward introduced, among them: *ermine*, or ermine with the field sable and the spots argent; *ermutis*,



with a red hair on each side of the black spot; *ermineois*, with the field gold and the spots black; *pean*, with the field sable and the spots or; *countervair*, or vair with the bells of one tincture placed base to base; *potent*, with figures like the heads of crutches; and *counterpotent*, with the heads of crutches alternately erect and reversed.

It is an established rule of heraldry that metal should not be placed on metal, nor color on color—a rule more rigidly adhered to in English than in foreign heraldry. Among early arms there is one remarkable transgression of it in the arms of the Kingdom of Jerusalem, founded by the Crusaders, which are five golden crosses on a silver field. A recognized exception exists wherever a charge lies over a field partly of metal and partly of color, or where an animal is attired, armed, unguled, crowned, or chained with a tincture different from that of his body. Marks of cadency, chiefs, cantons, and bordures are also occasionally exempted from the general rule, being, according to some heralds, not laid on the shield, but *cousu*, or sewed to it.

Charges. Everything contained in the field of an escutcheon is called a *charge*. Charges are divided by heralds into the three classes of honorable ordinaries, subordinaries, and common charges. Under the name of ordinaries or *honorable ordinaries* are included certain old and very frequent bearings, whose true peculiarity seems to be that, instead of being taken from extraneous objects, they are representatives of the wooden or metal strengthenings of the ancient shields. Nine are recognized by the best usage. See Plate of HERALDRY, *Ordinaries and Subordinaries*.

1. The *chief* (Fig. 1) is the upper part of the shield separated from the rest by a line, and comprising, according to the requirements of heralds, one-third of the whole, though this proportion is seldom rigidly adhered to. Its diminutive is the *fillet* (Fig. 3), supposed to take up one-fourth the space of a chief, in whose lowest part it stands. The line at the base of the chief may be straight, indented, or irregular.

2. The *pale* (Fig. 4) is a band or stripe from top to bottom, said, like the chief, to occupy one-third of the shield. It has two diminutives—the *pallet*, one-half the breadth of the pale (Fig. 5), and the *endorse*, one-half of the pallet (Fig. 6).

3. The *bend* (Fig. 8) is a band crossing the shield diagonally from dexter chief to sinister base. Its diminutives are the *bendlet*, or *garter*, one-half of its breadth (Fig. 9), the *cost*, or *cotise*, one-half of the bendlet (Fig. 10), and the *riband*, one-half of the cotise. The bend is sometimes borne between two cotises, in which case it is said to be *cotised* (Fig. 11)—a term sometimes applied to the other ordinaries when accompanied with their diminutives.

The *bend sinister* (Fig. 12) is a diagonal band from sinister chief to dexter base. Its diminutives are the *scarp*, one-half of the bend sinister (Fig. 13), and the *baton*, one-half of the scarp (Fig. 14). The baton stops short of the extremity of the field at both ends and has been considered a mark of illegitimacy.

4. The *fess*, or *fesse* (Fig. 15), is a horizontal band in the middle of the shield, said, like the ordinaries already enumerated, to occupy one-third of it. The lines which bound it may be straight or irregular (Fig. 16).

5. The *bar* is similar in form to the fess, but narrower and never placed in the centre of the shield (Fig. 17). It is rarely used singly. When in pairs, they are called *bars gemelles*. The diminutives are the *closet*, theoretically half the width of the bar (Fig. 19), and the *barrulet*, half the width of the closet (Fig. 18). But these terms are seldom used.

6. The *chevron* (Fig. 20) is composed of two stripes forming an inverted V. Its diminutives are the *chevronel* (Fig. 21) of half, and the *couple close* (Fig. 23) one-fourth, its width.

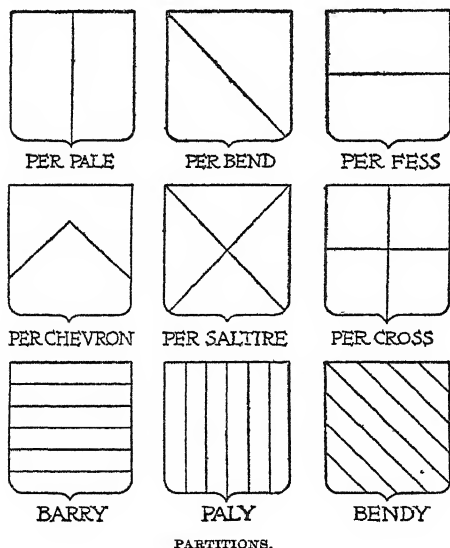
7. The *cross* (Fig. 24) unites the pale and fess, an ordinary which was originally, like the rest, composed of the clamps necessary to the strength of the shield, but had also the deeper meaning of the symbol of the Christian faith. Besides its plain form, the cross was varied in numerous ways, most of these varieties being, however, rather common charges than ordinaries. Of the 39 lesser crosses mentioned by Guillim, or the 385 by Berry in the *Encyclopædia Heraldica*, a few of the most frequently occurring are the following: the *cross moline* (Fig. 26), with the ends turned round both

ways; the *cross fleury* (Fig. 27), of which each limb terminates in a fleur-de-lis; the *cross patonce* (Fig. 28), the limb of which has three points; the *cross potent* (Fig. 29), crutch-shaped at the ends; the *cross patté* (Fig. 30), small in the centre, but widening towards the ends; and the *cross crosslet* (Fig. 31), crossed at the ends. The latter is the most frequent of all and is borne oftener in numbers than singly. Any of these crosses is said to be *fitchy* when the lower limb terminates in a sharp point, as in Fig. 36. There is also the *cross Maltese*; though not frequent as a heraldic charge, it derives an importance from being the badge of the Knights of Malta, and of many other orders (Fig. 32).

8. The *saltire*, or St. Andrew's cross (Fig. 57), is formed by a junction of the bend dexter and bend sinister.

9. The *pile* (Fig. 59) is a wedge with the point downward. A single uncharged pile should at its upper part occupy one-third the breadth of the shield, but, if charged, it may be double that width. It is used ordinarily either singly or in threes (Fig. 60).

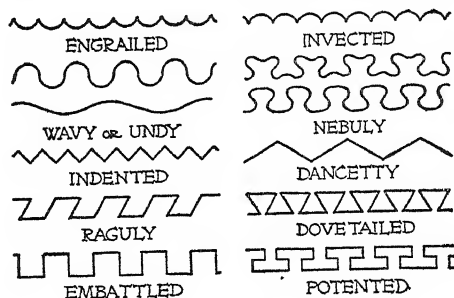
The *quarter*, consisting of the upper right-hand fourth part of the shield cut off by a horizontal and a perpendicular line, is classed by some authorities with the *honorable ordinaries*, but it is more common to consider it one of the *subordinaries* (see below). It is frequently termed a *canton* (Fig. 61).



It has been observed that the field of an escutcheon may be of two different tinctures, divided by a partition line which may vary in direction. (See Illustration, *Partitions*.) When divided by a partition line in the direction of one of the ordinaries, the shield is said to be *party per* that ordinary; thus, we may have a shield party per pale, bend, fess, chevron, saltire, or cross, though *quartered* is a more usual term than *party per cross*. A shield divided into any number of parts by lines in the direction of a pale, bend, or bar, is said to be *paly*, *bendy*, *barry*, the number of pieces being specified, as barry of six. When the field is of a metal and color separated by any of the lines of partition, then the charge placed on it is said to be *coun-*

terchanged; this means that the part of the charge which is on the metal is of the color, and vice versa.

The partition line which bounds the field, or the boundary line of an ordinary, is not always straight. The commonest forms of irregular partition lines in use are the *engrailed*, *invected*,



wavy, *nebuly*, *embattled*, *indented*, and *dancetty*. An ordinary engrailed has the points of the engrailed line turned outward, and an ordinary invected, inward. Dancetty differs from the indented by having much larger spaces between the points. All of these terms, even when unmistakably French in origin, are pronounced as if they were English.

The *subordinaries*, or subordinate ordinaries, are generally enumerated as the following, though there is no very broad line of demarcation between them and the common charges:

The *gyron*: when a shield is at once quartered and party per saltire, the division is called gyronny of 8, and each of the triangles is a gyron (Fig. 66). Gyronny of 6, 10, or 12, also occasionally occurs, so called according to the number of the triangles.

The *fret* (Fig. 76) is a cognizance derived from the banding or ornamenting of the shield, and a shield covered with this latticework decoration is said to be *fretty*.

The *bordure*, or border (Fig. 62), is a band encircling the shield. It is much used to distinguish different branches of a family and is often charged with small devices, on which account it has sometimes been reckoned an honorable ordinary (Fig. 63).

The *orle* (Fig. 64) differs from a bordure in not touching the extremity of the shield and is narrower.

The *tressure*, regarded as a diminutive of the orle, is generally borne double, and fleury counterfleury, as in the arms of Scotland (Fig. 65).

The *pall* (Fig. 77) is the archiepiscopal ornament of that name, sent from Rome to metropolitans, and resembling in form the letter Y. By some authorities this is classed as a common charge and not as a subordinate.

The *flanches* (Fig. 67) are the dexter and sinister sides of the shield cut off by a curved line. Flanches are always borne in pairs and sometimes charged.

The *lozenge* (Fig. 68) is a figure of four equal sides, with the upper and lower angles acute, and the others obtuse.

The *fusil* (Fig. 72) is longer and more acute than the lozenge.

The *mascle* (Fig. 69) is a lozenge perforated and showing a narrower border. Mascles may have been originally links of chain armor.

A field is said to be *lozengy*, *fusilly*, or *mas-*

cally when divided by diagonal lines in the direction of these subordinaries. A field divided by horizontal and perpendicular lines into squares of different tinctures is said to be *checky*; in the case of a *fess checky* there are three such rows of squares.

The *inescutcheon* is a small shield charged upon the coat of arms.

The *billet* (Fig. 73) is a rectangle about twice as high as it is wide. When the shield is freely sprinkled with billets, it is termed *billey*. Some think the billets represent bricks, stones, or billets of wood; others think they represent letters or billets.

Among subordinaries are sometimes reckoned certain circular charges called *roundles*, or *roundlets* (Fig. 74), distinguished in English heraldry by different names according to their tinctures. When of or, they are called *bezants*; of argent, *plates*; of gules, *torteaux*; of azure, *hurts*; of purple, *golps*; of sable, *ogresses* or *pellets*; and of green, *pommes*.

Common Charges. The third class of figures occurring in armorial bearings are the *common charges*. These are representations more or less conventional of familiar objects, which have no necessary relation to the shield, but are in some way emblematic as concerns family or individual history and character. We can enumerate only a few of the charges of most frequent occurrence.

Among the animals borne in coats of arms the lion holds the most important place. As early as the twelfth century the king of beasts was assumed as an appropriate emblem by the sovereign of England. The kings of Scotland, Norway, and Denmark, the native princes of Wales, the counts of Flanders and Holland, and various other European rulers also chose the king of beasts. Lions occur in different positions. The earliest attitude of the heraldic lion is *rampant*, erect on his hind legs, but touching the ground with only one foot, and looking before him, the head being shown in profile, as he appears in the arms of Scotland and originally did in those of England. This was the normal position of a lion; but as the royal animal came to be used by all who claimed kindred with royalty, and to be granted to favorite followers by way of augmentation, a diversity of attitude was adopted for distinction's sake: *rampant gardant*, erect on the hind legs, and affronté, or full-faced; *rampant regardant*, erect on the hind legs and looking backward; *passant*, in walking position, with the head seen in profile; *passant regardant*, walking and with the head looking behind; *statant*, with all the four legs on the ground; *salient*, in the act of springing forward on his prey; *sejant*, rising to prepare for action; *sejant affronté*, rising and full-faced, as in the crest of Scotland; *couchant*, lying down, but with his head erect and his tail beneath him; *dormant*, asleep, with his head resting on his forepaws. Some of these terms are used for the other animals. The lion passant gardant is often blazoned as the *lion of England* and was originally styled a *leopard*; hence the lion passant and rampant gardant came to be called respectively the *lion leopárdé* and *leopard lionné*. Two lions may be depicted: *rampant combattant*, i.e., face to face; or *rampant addorsed*, placed back to back, or *counterpassant*, i.e., passing the contrary way to each other. The lion is said to be *naissant* when he appears to be rising out of the centre of an ordinary. Among leonine monsters we have two-headed lions, bicorporate

and tricorporate lions, lion dragons, and lion poissons. There is also the Bohemian lion, with two tails, and the more celebrated winged lion of St. Mark, adopted by the Republic of Venice. Two or more lions borne on one shield are



RAMPANT



RAMPANT GARDANT



RAMPANT REGARDANT



PASSANT



PASSANT GARDANT



PASSANT REGARDANT



SALIENT



COUNTERPASSANT



COMBATTANT



DISMEMBERED



DEMILION



TRICORPORATE



WINGED



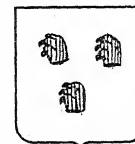
QUEUE FOURCHÉE



LION'S HEAD



LION'S GAMB



LION'S PAWS



LION'S TAILS

sometimes (though never when on a royal coat) blazoned *lioncels*.

Bears, boars, bulls, and stags are favorite heraldic beasts. A stag walking is said to be *trippant*; when lying down with his head erect, he is *lodged*; when running, he is *courant*; he is *at gaze* when a lion would be *statant gardant*; he is *attired* of any tincture when his horns are of that tincture. The animals that possess horns and hoofs are said to be *armed* in respect to them. The heads and limbs of animals are often borne as charges, and they may be either *couped*, cut off in a straight line, or *erased*, cut off with a jagged edge. When the head is borne without any part of the neck and full-faced, it is said to be *caboched*, or *caboshed*. When the hair of an animal is of a different tincture from the body, the animal is said to be *crined* of this color. Animals, as well as other common charges, are usually represented in a purely conventional

manner and frequently bear no resemblance to the object for which they are named.

Of birds, there is the *eagle*, which was, next to the lion, the most favorite cognizance of royal personages and was adopted by the German emperors, who claimed to be successors of the Cæsars of Rome. The Imperial eagle had at first but one head; the monstrosity of a second head seems to have arisen from a dimidiation of two eagles to represent the Eastern and Western empires. (See section *Marshaling of Arms*.) The eagle of heraldry is most generally *displayed*, i.e., its wings are expanded; sometimes it is *preying*, or standing devouring its prey. The *allerton*, the cognizance of the Duchy of Lorraine and the family of Montmorency, was originally but a synonym for the eagle (assumed, perhaps, as an anagram for the word Lorraine), but modern heralds have degraded it into a nondescript creature without beak or feet. The *martlet* was originally a martin, which has also in course of time been

beak and talons are represented. Such as have no talons are *beaked and membered*; i.e., the beak and legs are of a different color from the body. The cock is said to be armed *crested and jelloped*, the latter term referring to his comb and gills. Birds having the power of flight are, in respect to their attitude, *close*, *rising*, or *volant*.

Fishes and reptiles occur as charges: the former are said to be *naïant* if drawn in a hori-



TIGER



LEOPARD'S FACE



STAG AT GAZE



STAG LODGED



STAGS HEAD CABOCHED



BEAR



ANTELOPE



PASCHAL LAMB



EAGLE DISPLAYED



FALCON RISING



PELICAN



MARTLET



DOLPHIN



DRAGON



GRIFFIN



WYVERN



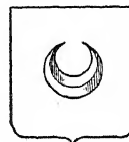
COCKATRICE



MERMAID



SEA LION

SUN
IN HIS SPLENDOR

MOON



ESTOILE



GARB



POMEGRANATE



MAUNCH

deprived by heralds of its legs and beak. (See CADENCY.) The mythical phoenix, the pelican, the swan, the cock, the falcon, the raven, the parrot, or popinjay, and the peacock are all of tolerably frequent occurrence. The pelican generally has her wings placed back to back and is depicted pecking her breast; she is then said to be *vulned*, i.e., wounded. When in her nest, feeding her young, she is called a pelican *in her piety*. A peacock borne affronté with his tail expanded is said to be *in his pride*. Birds of prey are armed, of the color of which their

zontal, and *haurient* if drawn in a perpendicular position; and the *dolphin*, in reality straight, is conveniently borne *embowed*, or bent. Sometimes the conventional heraldic form of an animal differs very greatly from its true form, as in the case of the antelope of heraldry, which has the head of a stag, a unicorn's tail, a tusk issuing from the tip of the nose, a row of tufts down the back of the neck, and similar tufts on the tail, chest, and thighs. Of "animals phantastical," we have, among others, the griffin, wyvern, dragon, unicorn, basilisk, harpy. We have the human body in whole or part, as a naked man or "savage," also arms, legs, hearts, Moors' heads, Saracens' heads, and that strange heraldic freak, the three legs conjoined carried in the escutcheon of the Isle of Man.

Of plants, there are roses, trefoils, quatrefoils, cinquefoils (conventional representations of flowers with three, four, and five leaves), leaves, garbs (i.e., sheaves of corn), trees, often *eradicated* or *fructuated* of some other color, and above all the celebrated *fleur-de-lis*, used as a badge by Louis VIII of France in 1223. When the charge is repeated a large number of times, the term *semé* is applied to it. When a plant, animal, or other charge is blazoned *proper*, what is meant is that it is of its natural color.

The heavenly bodies—the sun, moon, and stars—are also pressed into the service of heraldry, as are things inanimate and artificial without number, particularly such as were familiar to

the warriors and pilgrims of the twelfth and thirteenth centuries. Helmets, buckles, shields, hatches, horseshoes, swords, arrows, battering rams, pilgrims' staves, mullets (or spur rowels), and water boujets, or bags, in which in crusading times water was carried long distances across the desert; also the clarion or war trumpet, sometimes erroneously called a *rest*, because it was supposed to represent a rest for a lance. Even the letters of the alphabet have been used as charges.

When the field or any charge is covered with drops, it is called *guty*; when adorned with fleurs-de-lis, it is called *fleury*, or *flory*. When an ordinary is made up of squares of alternate metal and color, it is called *compony*, or *gobony*. When an ordinary has a border of different tinctures, it is said to be *fimbriated*.

Charges may be placed either simply on the field or on one of the ordinaries; in some instances one of the ordinaries is placed over a charge, in which case the charge is said to be *debruised* by the ordinary. Three charges of one kind are placed two above and one below, unless blazoned *in fess* or *in pale*. In the fourteenth and fifteenth centuries the simplicity of early heraldry began to be departed from by accumulating a variety of charges on one shield, and in later times we have sometimes a charge receiving another charge like an ordinary. The growing complexity of shields arose from augmentations granted to distinguish the younger branches of a family, or charges assumed from the maternal coat by the descendants of an heiress. In the end of the eighteenth and beginning of the nineteenth century, a practice prevailed for a time of introducing into armorial bearings matter-of-fact landscapes, representations of sea fights, and of medals and decorations worn by the bearer, setting all heraldic conventionalities at defiance, and dealing in details not discernible except on the minutest inspection.

The arms of the different members of a family have been distinguished from one another, sometimes by the use of a bordure or other difference; and sometimes, especially by English heralds, by the use of certain figures called *marks of cadency*. (See *CADENCY*.) Sometimes the differences and marks of cadency are called *diminutions*.

Besides the heraldic devices depicted on the shield, there are the following borne external to it—the helmet, the mantling, the wreath, the crest, the motto and scroll, the supporters, and the coronet.

The *helmet*, originally a piece of defensive armor, became in the course of time one of the usual accompaniments of the shield; and placed over the arms, it came by its form to mark the rank of the wearer. These distinctions date from the reign of Queen Elizabeth and are applicable only to British heraldry.

The *mantling* is an embellishment of scroll-work flowing down on both sides of the shield, and originating in the *cointoise*, or scarf, wrapped round the body in the days of coat armor.

From the centre of the helmet, within a wreath of two pieces of silk usually of the first two colors of the armorial bearings, issues the crest, originally a special mark of honor worn only by heroes of great valor, or advanced to a high military command; now an inseparable adjunct of the coat of arms in English, though

not in continental heraldry, and sometimes assumed or changed arbitrarily, although this is illegal.

The *scroll*, placed over the crest or below the shield, contains a *motto* bearing in many cases an allusion to the family name or arms. The motto was originally the war cry of the bearer.

Supporters are figures or animals standing on each side of the escutcheon and seeming to defend or support it. They were in their origin purely ornamental devices, which only gradually acquired an heraldic character. In England the right to use supporters is confined to the royal family, peers, peeresses, and peers by courtesy, Knights of the Garter, of the Thistle, and St. Patrick, Knights Grand Cross of the Bath, and a very few families whose ancestors bore supporters before their general use was restricted. In Scotland supporters are also used by the baronets of Nova Scotia and the chiefs of various families. They have sometimes been conferred on towns, e.g., Liverpool, Belfast.

The crown of the sovereign, the mitre of the bishop, and the coronet of the nobility are adjuncts appended to the shield of those whose dignity and office entitle them to that distinction.

Blazonry. This is the art of describing, in technical terms, the charges borne in arms—their positions, gestures, tinctures, etc., and the manner of arranging them on the shield. As heraldry, though arbitrary, is very exact, the rules of blazoning are observed on all occasions with the most rigid precision. The following are the most important: In blazoning or describing a coat of arms, avoid repetitions and use as few words as possible. Begin with the field, naming the tincture or tinctures, and mentioning the lines by which it is divided—*per pale*, *per fess*, etc., if such there be—and noticing if they are indented, enrailed, or the like, it being taken for granted that they are straight unless the contrary is mentioned. The charges are named next, beginning with the most important and nearest the centre, giving their number, position, and tincture; e.g., the Affleck family bears *argent, three bars, sable*; the Aldboroughs, *barry of ten, argent and azure, a lion rampant, gules*. Usually the ordinaries and their diminutives come first; but the *chief*, *bordure*, or *canton* generally comes last; e.g., the Gainsboroughs bear *or fretty gules, a canton, ermine*. Where the principal charge is not in the centre, its position must be named, as in *first quarter*. When an ordinary *debruises* another charge, the latter is named first unless some other direction is given. Two charges are *in pale*, i.e., one above the other; three are represented two above, one below; when a *fess* or *bend* is between six similar charges, three are in chief and three in base. In all other cases the position of the charges must be described. When the ordinary bears a charge and there are also other charges in the field, the latter are named before the charges on the ordinary. When a tincture occurs twice, it is not repeated, but of *the field*, of *the first*, etc., are used. The Anglesey family bears *sable, on a cross enrailed between four eagles displayed argent, five lions passant guardant of the field*. When there is an equal number of two charges, "as many" is used instead of repeating the number. The Leiths bear *or, a cross-crosslet filchy, sable, between three crescents in chief, and as many lozenges in base, gules*. The Parkers bear *gules, on a chevron, between three keys erect, argent, as many*

fleurs-de-lis of the field. Finally the differences, crests, and supporters are described. A full knowledge of blazonry can be acquired only by the careful study of many examples.

Marshaling of Arms. This is the combining of different coats of arms in one escutcheon, for the purpose of indicating family alliance or office. In the earlier heraldry it was not the practice to exhibit more than one coat in a shield, but the arms of husband and wife were sometimes placed *accollé*, or side by side, in separate escutcheons; or the principal shield was surrounded by smaller ones, containing the arms of maternal ancestors; and not infrequently maternal descent or marriage was indicated by the addition of some bearing from the wife's or mother's shield. Then followed *dimidiation*, where the shield was parted per pale, and the two coats placed side by side, half of each being shown. By the more modern custom of impaling, the whole of each coat is exhibited, a reminiscence of the older practice being retained in the omission of bordures, orles, and tressures on the side bounded by the line of impalement. The most common case of impalement is where the coats of husband and wife are conjoined, the husband's arms occupying the dexter side of the shield, or place of honor, and the wife's the sinister side. Bishops, deans, heads of colleges, and kings-at-arms impale their arms of office with their family coat, giving the dexter side to the former.

A man who marries an heiress (in heraldic sense) is entitled to place her arms on a small shield called an *escutcheon of pretense*, in the centre of his achievement, instead of impaling them.

Quartering, or the exhibiting of different coats on a shield divided at once perpendicularly and horizontally, is the most common mode of marshaling arms—a practice which, however, was unknown till the middle of the fourteenth century. The divisions of the shield are called quarters and are numbered horizontally, beginning at the dexter chief. The most common object of quartering is to indicate descent. The coats quartered in an escutcheon must all have been brought in by successive heiresses, who have intermarried into the family. In the case of a single quartering the paternal arms are placed in the first and fourth quarters, and the maternal in the second and third. The third and fourth quarters may, in after generations, be occupied by the arms of a second and third heiress. Sometimes an already quartered coat is placed in one of the four quarters of the escutcheon, then termed a *grand quarter*. We occasionally find a shield divided by perpendicular and horizontal lines into six, nine, or even more parts, each occupied by a coat brought in by an heiress; and in case of an odd number of coats, the last division is inconveniently crowded by the accumulation of coats, including the several coats to which each heiress may in a similar way have become entitled. In Germany sometimes 20 or 30 coats are found marshaled in one escutcheon; but in British heraldry families entitled to a number of quarterings generally select some of the most important.

Sovereigns quarter the ensigns of their several states, giving precedence to the most ancient, unless it be inferior to the others in importance. In the royal escutcheons of the United Kingdom England is placed in the first and fourth

quarters, Scotland in the second, and Ireland in the third; the relative positions of Scotland and England being, however, reversed on the official seals of Scotland. Spain bears the arms of Leon in the first and fourth quarters, and Castile in the second and third. An elected king generally places his arms surtout on an escutcheon of pretense.

National Coats of Arms. The coats of arms whose use has obtained official sanction by national governments present in most cases the family heraldic insignia of their sovereigns. The English arms, e.g., have reflected every claim of family inheritance of the royal line since the origin of coats of arms in the twelfth century. They were, under Richard Cœur de Lion and his immediate successors, the three leopards of the Plantagenet house. When Edward III laid claim to the crown of France, he quartered with his arms the lilies of the royal house of that country. The Irish harp was added when Henry VIII took the title of king of that country. Similarly, when the Stuart line succeeded, they placed the rampant lion of Scotland in the upper right-hand field. William III placed a scutcheon with the line of the house of Orange in the centre of the British shield, and the Hanoverian sovereigns replaced this by their family scutcheon. The lilies of France were removed with the disuse of the French title, in 1801, and the scutcheon of the house of Hanover on the accession of Queen Victoria in 1837. Since that time the British coat of arms in its full form has consisted of the shield with four fields—two occupied with the golden leopards of England, the other two occupied by the old arms of Scotland and Ireland respectively. Above the shield is a helmet, and still above this the crown with a golden-crowned lion. Surrounding the shield is the order of the Garter with its legend. Below the shield are two clusters of branches, made up of the English rose, the Scotch thistle, and the Irish shamrock intertwined, and the motto *Dieu et Mon Droit*. As supporters, there are dexter, a golden-crowned lion, and sinister, a silver unicorn with a crown around his neck and a chain hanging from this.

France, after having used at various times the oriflamme, the lilies, the Napoleonic eagle, and other emblems, possesses, under the present Republic, no authoritative or universally applicable coat of arms. By a decree passed in 1870, however, a seal was adopted consisting of a seated female figure holding a bundle of victor's rods. In 1896 a decorative emblem was authorized consisting of the initials "R. F." (*République française*) surrounded by a crown of laurel leaves, with French flags crossed at the back, oak and laurel branches below, the order of the Legion of Honor and the fasces at the back. A common device, too, is a shield bearing the national colors in three vertical bars, with the fasces in the central space and the letters R and F on olive branches to right and left.

The arms of the German Empire consist of the great double-headed black eagle of the Empire, surmounted by the Imperial crown and bearing on its breast the Prussian coat of arms. This is a silver shield with a single-headed eagle holding in its claws the royal ball and sceptre, with the Hohenzollern arms on its breast. The silver shield is surrounded by the chain and pendant of the Order of the Black Eagle.

Russia and Austria-Hungary also use the double-headed eagle, in both cases both heads

being crowned; and in both with an Imperial crown above. In the Russian arms the eagle bears on its breast a shield with St. George; in the Austrian a shield with the arms of Hapsburg, Austria, and Lorraine.

The coat of arms of Spain consists of a shield on which the arms of Castile and Leon are quartered, a point below bearing the pomegranate of Granada, and a small central shield bearing the arms of Bourbon-Anjou.

The coat of arms of Italy is a shield with the silver cross on a red field, covered with a red ermine-lined baldachin, surmounted by the Italian crown. The cross was granted to the counts of Savoy by the Knights Hospitalers in the fourteenth century as an acknowledgment of help given to them against the Turks.

Similarly the coats of arms of other European countries represent in most cases the origin and fortunes of their royal families.

The newly formed nations of America found it necessary to adopt coats of arms deliberately instead of using the personal devices of their rulers. The Congress of the United States appointed a committee to prepare a coat of arms and a seal for the new nation on July 4, 1776, the very day of the Declaration of Independence. The devices reported by this and by several succeeding committees were not, however, satisfactory, and it was not till June 20, 1782, that the coat of arms was finally approved. Since that time it has not been changed. It consists of an American or bald eagle, displayed; with shield on breast showing 13 pales (vertical stripes), alternately white and red. The shield has a plain blue chief binding the stripes together. The dexter talon holds an olive branch, and the sinister, thirteen arrows. Above the eagle is a golden glory surrounded by a white cloud enclosing blue. Upon this are thirteen white five-pointed stars. The motto on a ribbon in the eagle's beak is, *E Pluribus Unum*. Each State of the American Union has its own coat of arms, though none has an individual flag.

Most of the republics of Central and South America adopted coats of arms on the attainment of their independence, usually introducing into them some objects of local as well as symbolical significance. Mexico, e.g., in 1823, adopted as its national coat of arms a figure of an eagle tearing a snake in its beak and poised upon a "nopal," or cactus, growing on a rock. The rock and the nopal are both connected with the old name of the city and province of Mexico, *Tenochtitlan*. This coat of arms was afterward changed by Maximilian, but was restored on the downfall of his empire. The coat of arms of Peru contains a figure of the llama, the national beast of burden, and of the tree from which the Peruvian bark or cinchona is taken. That of Guatemala shows the bird Quetzal, the "pito real," or royal bird, of the old Spanish discoverers. The peaks of the Andes occur in several of the South American national coats of arms. That of the Republic of Brazil, adopted in 1889, consists of a five-pointed star with a round shield placed upon it. On this shield are figured the stars of the Southern Cross, and it is surrounded by 20 silver stars, representing the states of the Republic. Below are a sword and branches of laurel and of the tobacco plant, with an inscription. See Plates accompanying NATIONAL COATS OF ARMS.

The terms and usages of heraldry vary somewhat in the different countries. In this article

the rules of English heraldry have been followed. Consult the standard works of Guillim, *Display of Heraldry* (London, 1610; 6th ed., 1724); Edmondson, *Complete Body of Heraldry* (ib., 1780); Nisbet, *System of Heraldry* (ib., 1722-43; 3d ed., 1816); and for a more discriminating view of the subject, Gourdon de Genouillac, *L'Art héraldique* (Paris, 1909); Hulme, *History, Principles, and Practice of Heraldry* (New York, 1892); Woodward and Burnet, *A Treatise on Heraldry, British and Foreign* (Edinburgh, 1896); Eve, *Decorative Heraldry* (New York, 1897); Davies, *Armorial Families* (ib., 1903); Crozier, *General Armory: Register of American Families Entitled to Coat Armor* (ib., 1904); J. Vinycomb, *Fictitious and Symbolic Creatures in Art, with Special Reference to their Use in British Heraldry* (London, 1906); Henry Whittemore, *Origin and Antiquity of Heraldry* (New York, 1908); H. G. Todd, *Armory and Lineages of North America* (ib., 1913); W. H. S. Hope, *Grammar of English Heraldry* (ib., 1913); J. H. Stevenson, *Heraldry in Scotland* (2 vols., ib., 1914).

HERALDS' COLLEGE, or **COLLEGE OF ARMS**. A collegiate body, founded by Edward IV in 1464 and chartered by Richard III in 1483. It consists of the heraldic officers of England. After various charters had confirmed its privileges, it was reincorporated by Philip and Mary, who bestowed on it Derby House, on the site of which in Doctors' Commons the present college was built by Sir Christopher Wren.

The presidency of the college is vested in the Earl Marshal, an office now hereditary in the family of Howard, Duke of Norfolk; he nominates the three kings-at-arms, six heralds, and four pursuivants, who are the members of the collegiate chapter. Persons having an hereditary claim to arms, which has been disused for one or more generations, are empowered by the Heralds' College to resume them on proof and registration of pedigree. A person who has no hereditary claim and wishes a grant of arms must memorialize the Earl Marshal and show that he is in condition to "sustain the rank of gentry." An important department of the college is the recording of pedigrees. Any pedigree showing the existing state or descent of a family may, if accompanied with sufficient evidence, be entered on the books of the college. The members have salaries, but derive their principal income from fees charged for assistance in tracing pedigrees and titles and for the granting and registration of arms. The college has long since lost all authority to enforce its regulations. In Scotland the corresponding functions belong to the Lyon Court (q.v.) and in Ireland to the Office of Arms. See **HERALDRY**.

HERAPLEION. See **CANDIA**.

HERAT, hēr-ăt'. The capital of the province of the same name in Afghanistan (q.v.). It is situated in the western part of the country, on the river Heri-Rud, about 50 miles south of the Russian frontier and the same distance east of the Persian border (Map: Afghanistan, K 5). From it radiate caravan routes, north, east, south, and west, to Turkestan, the interior of Afghanistan, India, and Persia. The town, forming a quadrangle about 1 mile square, is surrounded by strong fortifications, having towers and gates, and with a strong citadel at the north end; the streets are narrow and crooked, and the buildings are unsightly. There are an ancient ruined mosque, and a tomb of

Abdullah Ansari, with splendid examples of Oriental sculpture. The surrounding valley is of remarkable natural beauty and fertility. Fine fields of grain and attractive gardens adorn the landscape. The King's Garden was once famous. Herat manufactures and exports carpets, blades, and rosewater. Its position on the route from Persia to India explains its commercial importance, while its proximity to the Russian border lends to it great strategic and political significance, though it is no longer regarded as the key to India. The population, formerly much greater, is estimated at 15,000 and is very heterogeneous. Herat is supposed to have been founded by Alexander the Great. In the seventh century it came under the dominion of the Arabs. It was conquered by Timur in 1381, under whose reign it grew to be a centre of Persian learning and art. In 1510 it passed into the hands of Persia. The Afghans took it in 1749. During the civil wars in Afghanistan Herat became independent and remained so from 1823 to 1863, when it once more became a part of Afghanistan.

HÉRAULT, à'rô'. A maritime department in the south of France (q.v.), formed from Lower Languedoc, bounded on the southeast by the Gulf of Lyons (Map: France, S., H 5). Area, 2403 square miles. Pop., 1911, 480,484. It is crossed in the north by the Cévennes Mountains, which slope southeast to the Mediterranean plains. The principal rivers are the Hérault, the Orb, and the Livron; the Canal du Midi ends at Cette. Along the coast line from Agde to the Vidoule are numerous marshy lakes, united by the Canal-des-étangs. In this part the climate is unhealthy, but elsewhere throughout the department it is usually fine. Hérault ranks among the foremost wine-growing departments of France, one-third of its land being devoted to the culture of the grape. Silkworms are reared, and woolen, silk, and cotton fabrics, leather, and brandy are manufactured. Coal and copper mines as well as quarries of marbles, building stone, and granite are worked. Hérault supplies a great part of the salt used in France. Capital, Montpellier.

HÉRAULT DE SÉCHELLES, de sâ'shêl', MARIE JEAN (1759-94). A French revolutionist, born in Paris. An author, politician, and advocate, imbued with the teachings of Diderot, he was rather a philosopher than a revolutionist and was at first but moderately attracted by the radical element in the Legislative Assembly, to which he was elected in 1791. But he soon took his stand with the extreme left and supported Danton in the revolution of August and September (1792). He was deputy from the Department of Seine-et-Oise to the Convention of the same year and voted for the King's death. He was president of the convention for several terms and was author of the constitution which was preferred to that of Condorcet (q.v.), but which was never enforced. As a member of the Committee of Public Safety, he aroused the enmity of Robespierre, who, under the pretext that he had had traitorous dealings with the Army of the Rhine, insisted upon his arrest and execution. The best of his writings were printed under the title *Voyage à Montbard* (last ed., 1890). His *Œuvres littéraires* were edited by Dard (Paris, 1907). Consult A. Aulard, *Les orateurs de l'Assemblée Législative et de la Convention* (ib., 1906).

HERB, ərb or hərb (OF., Fr. *herbe*, from Lat. *herba*; probably connected with OLat. *forbca*, food, Gk. *φωβή*, *phorbē*, pasture, *φάσκειν*, *pharkein*, to feed). Any small vascular plant that does not develop secondary wood. The term is difficult to define because it depends upon stature and the relative amount of wood tissue. All herbs are woody plants in the sense that they contain woody strands, but ordinarily they do not produce secondary wood, and therefore there is no compact woody cylinder. The herbaceous character is usually associated with the annual habit, at least for the parts aboveground. The original classification of plants was into herbs, shrubs, and trees, so that the term is an exceedingly old one in botany.

HERBARIUM (Lat., from *herba*, herb). A systematic collection of dried plants, representing the flora of one or more regions. An herbarium represents the best possible record of plants and is indispensable as a basis for any systematic presentation of a flora. Of course, the study of living plants in their natural surroundings is the ideal method and is employed as far as possible. But such a method is necessarily incomplete and must be supplemented by the complete records of the herbarium. One of the essential features of an herbarium is that it contains the specimens, called "types," from which the original descriptions of species and genera were drawn. These types are kept for reference, so that there may be no uncertainty as to the plants described by different authors; and it may be said that in a certain sense the value of an herbarium is measured by the number of types and authentic specimens it contains. Second only in value to type specimens are the exsiccata, which are distributed collections usually made by notable collectors in relatively inaccessible regions. These distributed collections are authoritative and are really cotypes. In addition to types and exsiccata herbaria accumulate general collections representing all species possible and all phases of each species. Large herbaria thus become centres of taxonomic work. Owing, however, to the great expense involved in maintaining them, extensive herbaria are not numerous; the local collections possessed by a large number of institutions and individuals are generally quite small.

In the United States there are three herbaria of first rank, and each is the background of continual publication. The oldest is the *Gray Herbarium*, which belongs to Harvard University. Its great value lies in the fact that it contains the vast majority of the older types of American plants, but its annual additions are also very large. The *Herbarium of the New York Botanical Garden*, formerly at Columbia University, was developed remarkably during the closing years of the nineteenth century. Its accumulation of material and wealth of types make it indispensable in any taxonomic work. The *United States National Herbarium*, stored in the United States National Museum, has become a collection of national importance, since it contains a vast accumulation of material brought together by government collectors, and also many of the most important collections of the early government surveys. After these three great collections, those at the Missouri Botanical Garden (St. Louis) and at the Field Columbian Museum (Chicago) are probably next in importance. Many of the larger universities also contain noteworthy collections. The three

greatest herbaria in Europe deal more with the flora of the whole world than do the American herbaria. The greatest of all herbarium collections is that at the Royal Gardens at Kew, which has been enriched for many years by means of the numerous colonial enterprises of the British Empire. The *Herbarium of the Jardin des Plantes* at Paris is rich in older types, especially of American plants. The University of Berlin has built up a large herbarium, which has become one of first importance. Probably next in importance are the herbaria at Geneva, Vienna, and St. Petersburg.

For directions as to the collection of plants and their preparation for the herbarium, consult Bailey, *Botanizing* (Providence, R. I., 1899).

HERBART, hĕr'bärt, JOHANN FRIEDRICH (1776-1841). A German philosopher. He was born at Oldenburg, May 4, 1776. He studied at Jena, where Fichte was just beginning to be an influential factor in the university life, and for a while he was ardent in his loyalty to Fichte's views; but after more reflection he found himself obliged to reject much of that system and to form one of his own. After tutoring for several years in Switzerland he qualified as docent in philosophy and pedagogy at Göttingen in 1802 and three years later was appointed professor extraordinarius. In 1809, at the instance of W. von Humboldt, then at the head of the Department of Public Instruction, he was called to a professorship of philosophy and pedagogy at Königsberg, to succeed Krug, who succeeded Kant; but in 1833 he was recalled to Göttingen, where he continued in incessant pedagogical and philosophical activity until his death, Aug. 14, 1841. His writings were collected and published by Hartenstein (12 vols., Leipzig, 1850) and reprinted in Hamburg (13 vols., 1883-93). Another edition is appearing at Langensalza. His pedagogical works have been published in two volumes at different times (1873, 1875, and 1880). Some of his letters were published in 1871 and in 1877. His chief works are: *Allgemeine Pädagogik* (1806); *Hauptpunkte der Metaphysik* (1806); *Allgemeine praktische Philosophie* (1808); *Lehrbuch zur Einleitung in die Philosophie* (1813); *Lehrbuch zur Psychologie* (1816; Eng. trans. by M. K. Smith, 1891); *Psychologie als Wissenschaft* (1824); *Allgemeine Metaphysik* (1828-29). In addition to the one mentioned above, the following translations should be mentioned: *Application of Psychology to the Science of Education*, translated by Mulliner (New York, 1898); *Herbart's ABC of Sense-Perception, and Minor Pedagogical Works*, translated by Eckoff (ib., 1896); *The Science of Education*, translated by H. M. and E. Felkin (Boston, 1893); *Introduction to the Pedagogy of Herbart*, translated by Zimson (ib., 1894); *Outlines of Educational Doctrine*, translated by Lange and annotated by De Garmo (New York, 1901).

His philosophy is a thoroughgoing atomism (q.v.), according to which the universe is constituted of monads, or "reals," simple, unchangeable, and in their real nature unknowable. These "reals" stand in accidental relations to each other, and it is the changes in these relations that constitute the process of change in the world of experience. The "reals" disturb each other and provoke reaction in each other in self-defense. Such reactions are our ideas, which are called forth by the effort of our un-

knowable souls to maintain themselves. These ideas in turn tend to preserve themselves, and conscious life is the behavior of these ideas towards each other in the way of conflict or of mutual support—conflict when they are totally or partially opposed, support when they are alike. When conflict occurs, the intensity of ideas is diminished; diminution of intensity beyond a certain point means the disappearance of ideas "below the threshold of consciousness." The relation between ideas is thus a mechanical relation, and psychology is the mechanics of ideas. In the mechanical relation of ideas those already in consciousness have an important part to play with regard to new ideas just appearing. The ideas already present are called the apperceiving ideas, and the new ideas are said to be apperceived. The problem of education is to present such new ideas as can be most easily apperceived, i.e., incorporated with the old ideas to form knowledge. The central principle of all Herbart's reasoning is the abstract law of contradiction, interpreted metaphysically. That is, nothing can be ultimately real of which two contradictory predicates can be asserted. To predicate unity and multiplicity of an object is to predicate contradictions. Hence ultimate reality must be absolutely unitary and without multiplicity, hence also without change. Herbart's influence has been great both in philosophical and pedagogical lines. Among prominent Herbartians of recent times and of the present day may be mentioned M. A. Drobisch, O. Flügel, G. Hartenstein, M. Lazarus, H. Steinthal, L. Strümpell, W. F. Volkmann, T. Waitz, and R. Zimmermann. In America there is a Herbart Society, of which Prof. Charles De Garmo has been the leading spirit, and which issues an important *Year-Book*. Herbartian bibliography is very extensive. For the life of Herbart, consult: Hartenstein, in the introduction to his *Herbarts kleinere philosophische Schriften und Abhandlungen* (Leipzig, 1842); Allihn, "Ueber das Leben und die Schriften J. F. Herbarts," in *Zeitschrift für exacte Philosophie* (ib., 1860), which contains a bibliography; Hennig, *J. F. Herbart* (ib., 1877). For an account or for criticism of his views, consult: Lotze, "Ueber Herbarts Ontologie," in *Zeitschrift für Philosophie* (ib., 1843); Fechner, *Zur Kritik der Grundlagen von Herbarts Metaphysik* (ib., 1853); Kaftan, *Soll und Sein* (ib., 1872); Lipps, *Zur Herbart'schen Ontologie* (Bonn, 1874); Just, *Die Fortbildung der Kant'schen Ethik durch Herbart* (Eisenach, 1876); Wigget, *Pestalozzi und Herbart* (Leipzig, 1891); De Garmo, *Herbart and the Herbartians* (New York, 1895); Adams, *The Herbartian Psychology Applied to Education* (Boston, 1898); Wagner, *Vollständige Darstellung der Lehre Herbarts* (Langensalza, 1899); Hayward, *The Students' Herbart* (London, 1902); Kinkel, *J. F. Herbart, sein Leben u. seines Philosophie* (Giessen, 1903); R. D. Chalke, *Synthesis of Froebel and Herbart* (London, 1912); and various writings of F. H. Hayward; the various writings of the Herbartians mentioned above; also the histories of philosophy, such as those of Windelband, Höfding, Weber, Thilly. See APPERCEPTION.

HERB BENNETT. An aromatic herb. See GEUM.

HERBECK, hĕr'bĕk, JOHANN VON (1831-77). An Austrian musician, born in Vienna. He was practically a self-educated musician, but by hard work rose rapidly from the position of

chorister to that of professor in the Vienna Conservatory. From 1859 to 1870 and again from 1875 to 1877 he conducted the concerts of the Gesellschaft der Musikfreunde, which under his energetic leadership became events of prime importance. In 1866 he was made chief court kapellmeister and from 1871 to 1875 he was director of the Imperial Opera. He wrote many excellent part songs and some instrumental music. Consult E. Hanslick, *Suite (Zwei Wiener Kapellmeister)* (Vienna, 1884).

HERBELIN, ár'blän', JEANNE MATHILDE HABERT (1820-1904). A French miniature painter. She was born at Brunoy (Seine-et-Oise) and studied oil painting with her uncle, Jean Hilaire Belloc (1787-1866). Advised by Eugène Delacroix to confine herself to miniatures, she speedily reached the front rank in that branch of art, in which she created a new style. She exhibited 10 miniatures in the Salon of 1848 and received her first-class medal at the Exhibition of 1855 for "Child Holding a Rose," "A Souvenir," and "Girl Playing with a Fan." One of her miniatures was requested for the Luxembourg Gallery, the first of its kind admitted there. Besides ideal heads and genre studies, Madame Herbelin painted notable miniature portraits, such as those of Guizot, Isabey, Robert Fleury, Rossini, E. Souvestre, Rosa Bonheur, and Eugène Delacroix.

HERBELOT, ár'blo', BARTHÉLEMY D' (1625-95). A celebrated French Orientalist, born in Paris. After having learned Hebrew, Arabic, Turkish, and Persian, he traveled in Italy and was likewise for a time secretary and interpreter of Oriental languages to the French King. Three years before his death he was appointed professor of Syriac in the Collège de France. His celebrated work, *Bibliothèque Orientale*, was published after his death by Galland (Paris, 1697), and afterward with a supplement (Maestricht, 1776-81); but the best edition is that published at The Hague (4 vols., 1777-82). The work, which was not quite finished, contains extracts from a large number of Arabian, Persian, and Turkish authors, with abundant historical, biographical, and illustrative material relating to the peoples of the East. Among other works left unfinished by d'Herbelot is an Arabic, Persian, Turkish, and Latin dictionary. Consult Goujet, *Mémoires sur le Collège de France*, vol. iii (Paris, 1758); Lefranc, *Histoire du Collège de France* (ib., 1893).

HERBERAY DES ESSARTS, ár'brá' dâ zés'sâr', NICOLAS DE (?-1557). A French officer and translator. He was a Picard noble, and an officer in the royal artillery under Francis I, whom he accompanied to Madrid in 1525. Here he read and, at the King's request, translated from the Spanish the romance of *Amadis of Gaul* (1540-48). His other works include: *L'Amant maltraité de sa mye* (1539); *Le premier livre de la chronique de Dom Flores de Grèce, chevalier des Oignes* (1555); *L'Horloge des princes de Guevara* (1555). He has been called the founder of the heroic romance in France, traces of which are again apparent in the idealistic novels of George Sand and Octave Feuillet.

HERBERMANN, hër'bër-män, CHARLES GEORGE (1840-1916). An American editor. Born near Münster, Westphalia, Prussia, he came to the United States in 1851, seven years later graduated from the College of St. Francis Xavier, New York City, and afterward taught at

the City College, becoming professor of the Latin language and literature in 1869, and librarian, also, in 1873. In 1904 he became editor in chief of the *Catholic Encyclopedia*. He was president of the Catholic Club (1874-75) and of the United States Catholic Historical Society (1898-1913); published editions of Sallust's *Bellum Jugurthinum* and *Bellum Catilinarium*; edited *Unpublished Letters of Charles Carroll of Carrollton* (1902), Thébaud's *Forty Years in the United States* (1904), Waldseemüller's *Cosmographie Introductio* (1907), and *Diary of a Visit to the United States by Lord Russell of Killowen* (1910); translated Torsason's *History of Vinland*; and is author of *Business Life in Ancient Rome* (1880).

HERBERT. An historic British family, dating from the Norman Conquest, which has been ennobled in so many of its branches, by ancient and renewed creations, that it is impossible to ascertain with certainty which is the parent stem. Herbert, Count of Vermandois, who afterward filled the post of Chamberlain under William II, is mentioned in the roll of Battle Abbey and received from his sovereign a grant of lands in Hampshire. His wife, Emma, daughter of Stephen, Count of Blois, was a granddaughter of the Conqueror, and his son, Herbert of Winchester, was Chamberlain and Treasurer of King Henry I. In the reign of Henry V, Sir William Herbert, of Raglan Castle, County Monmouth, received the honor of knighthood in reward of his valor in the French wars. His eldest son, a staunch adherent of the house of York, was created Earl of Pembroke by Edward IV in 1469, but fell into the hands of the Lancastrians after the battle of Danes Moor and was beheaded the following day, when the title became extinct. It was, however, revived in 1551, in the person of his illegitimate grandson, William Herbert, one of the most influential noblemen of his age, both as a statesman and as a soldier. The fourth Earl, Lord Chamberlain to Charles I, and chancellor of the University of Oxford, was the founder of Jesus College in that seat of learning, his representative descendant being hereditary visitor. The eighth Earl held several high offices under Queen Anne, including that of Lord High Admiral. From him the present representative, Sidney, fourteenth Earl of Pembroke and Montgomery (born 1853), is directly descended. The earls of Carnarvon, more than one of whom have gained celebrity in the field of literature, descend from the eighth Earl of Pembroke, mentioned above. The present earls of Powis are descended from the same stock maternally, the only child and heiress of the last Earl of Powis of a previous creation having married the eldest son of Robert Clive, the founder of the British Indian Empire, in whose favor the title was renewed in 1804.

HERBERT, EDWARD, first LORD HERBERT OF CHERBURY (1583-1648). Commonly reckoned as the first of the English deistical writers. He was born of a noble family at Eyton-on-Severn, near Wroxeter, March 3, 1583. He was sent to Oxford in his twelfth year and by arrangement of his relatives at 16 married an heiress, but kept on with his studies. The marriage was happy, but there appears to have been little affection between Herbert and his wife, who was four years older than himself. In 1600 he removed to London and attracted Queen Elizabeth's notice. On the accession of James I he

was made Knight and invested with various offices. He left home for travel in France in 1608 and from this time resided very much abroad. After a brief return to his native country he set out again for the Low Countries, where he joined the arms of Maurice of Orange; he again offered him his services in 1614. After a campaign he traveled through Germany and Italy on horseback and went as far as Venice, Florence, and Rome. On his return he conducted a troop of Protestant soldiers from Languedoc into Piedmont to assist the Duke of Savoy against the Spaniards (1615), which was unsuccessful and brought him into a brief imprisonment. He soon returned to England and devoted himself to study and philosophical inquiry; but important diplomatic duties awaited him. He was sent to France as Extraordinary Ambassador (1618) to promote the alliance between France and England, and he was so far successful that he was appointed Ordinary Ambassador and continued to reside in Paris. He tried, but without much success, the difficult task of negotiation between Louis XIII and his Protestant subjects, and was abruptly recalled in 1624. He was elevated first to be a peer of Ireland, and then in 1630, five years after the accession of Charles I, to be a peer of England. When the Civil War broke out, he appears to have acted with hesitation, at first siding with the Parliament and then joining the King. His hereditary seat, Montgomery Castle, was attacked and burned. He died in London, Aug. 20, 1648. The result of his religious speculations is contained in his Latin treatises, *De Religione Laici* and *Ad Sacerdotes de Religione Laici*, issued with his *De Causis Errorum* (London, 1645); and *De Religione Gentilium* (Amsterdam, 1663; trans., *The Ancient Religion of the Gentiles and Causes of their Error Considered*, London, 1705). Herbert's position at the fountainhead of English Deism (see DEISM) gives them a peculiar significance. His speculations are those of a philosophical dogmatist rather than of a critical inquirer. He rejects revelation, and regards all religion as deduced from five axioms: God; worship; virtue; repentance; future life. His other works of general interest are his *Life and Reign of Henry VIII* (reprinted 1880); his *Poems* (1665; reedited by Collins, 1881); and particularly his *Autobiography*, edited by Lee, with introduction and continuation (London, 1886. Other eds., Boston, 1905; New York, 1907).

HERBERT, GEORGE (1593-1633). An English poet, brother of Lord Herbert of Cherbury, born in Montgomery Castle, Wales. He was educated at Westminster and at Trinity College, Cambridge, graduating B.A. in 1612-13, and M.A. in 1616. In 1615 he was elected fellow, and in 1619 he was promoted to the office of public orator. He now made the acquaintance of Bacon; in the hope of preferment he was induced to spend considerable time about the court. On the death of James I he studied divinity and finally took holy orders. He married in 1629, and the next year received the rectory of Bemerton, Wiltshire. Here he lived a most saintly life. But in less than three years he died of consumption and was buried beneath the altar of his church. While at Bemerton he wrote *The Temple, or Sacred Poems* (1633), which, though disfigured by conceits in the manner of the time, contains some of the finest

sacred lyrics in our language. He also wrote a prose work, *The Country Parson* (1652), which lays down rules for the guidance of a clergyman's life and may be considered a pendant to *The Temple*. A charming life of Herbert was written by Izaak Walton (*Life of George Herbert*, London, 1670). Consult also: Shorthouse, reprint of *The Temple* (ib., 1882); *Complete Works in Prose and Verse*, with Walton's *Life*, edited by Grosart (ib., 1874); *Poems*, issued by the Society for the Promotion of Christian Knowledge (ib., 1890); and *Life*, by the same society (ib., 1893); *Poems*, edited by A. Waugh (Oxford, 1908); *English Works of George Herbert*, edited in detail by G. H. Palmer (3 vols., New York, 1905); A. G. Hyde's *George Herbert and his Times* (ib., 1906) is a full and careful study. In 1911 a *Bibliography* (pamphlet) was prepared by G. H. Palmer for the Harvard University Library.

HERBERT, HENRY HOWARD MOLYNEUX. See CARNARVON, fourth EARL OF.

HERBERT, HENRY WILLIAM (1807-58). An American novelist, born in London. He studied at Eton from 1820 to 1825, graduated at Caius College, Cambridge, in 1830, emigrated to America in 1831, and for eight years taught Greek and Latin in a private school in New York City. He established in 1833 the *American Monthly Magazine*, which he edited till 1836, and contributed widely to newspapers and magazines. In 1834, under the pen name "Frank Forester," he began to write books on sports and sketches of outdoor life, which formed a series of great usefulness and popularity. His more serious literary work included several carefully written novels, chiefly historical, and translations from the French of Eugène Sue and Dumas. The last years of his life were embittered by domestic troubles and the estrangement of personal friends, and he died by his own hand. His novels and works on history include: *Cromwell* (1837); *Marmaduke Nyvil* (1843); *The Brothers: A Tale of the Fronde* (1844); *The Captains of the Old World* (1851); *The Cavaliers of England* (1852); *The Chevaliers of France* (1853); *The Puritans of New England* (1853); *The Captains of the Roman Republic* (1854); *Memoirs of Henry VIII of England and his Six Wives* (1858). Chief among the "Frank Forester Series" are: *Field Sports of the United States and the British Provinces of America* (1848); *Frank Forester and his Friends* (1849); *Complete Manual for Young Sportsmen* (1852); *Horses and Horsemanship of the United States and British Provinces* (1859). His *Poems* were published in 1887. Consult Picton, *Frank Forester's Life and Writings* (New York, 1881), and Judd, *Life and Writings of Frank Forester* (ib., 1882).

HERBERT, HILARY ABNER (1834-). An American Congressman and Secretary of the Navy. He was born at Laurensville, S. C., was early taken by his parents to Greenville, Ala., was educated at the University of Alabama and the University of Virginia, and was admitted to the Alabama bar in 1857. In the Civil War he commanded the Eighth Alabama (Confederate) Regiment and was disabled at the battle of the Wilderness in 1864. He was a member of Congress from 1877 to 1893, serving during several terms on the Committee on Naval Affairs, and hence was prominently connected with the reconstruction of the navy. From 1893 to 1897, during the second administration

of President Cleveland, he was Secretary of the Navy and subsequently practiced law in Washington. He edited: *Why the Solid South?* or, *Reconstruction and its Results* (1890); *The Race Problem at the South* (1901); *The Abolition of the Crusade and its Consequences* (1912).

HERBERT, IVOR JOHN CARADOC (1851-). An English soldier, born at Llanarth, Monmouthshire. At 19 he became a grenadier guardsman, and he was made a captain four years afterward. He distinguished himself in Egypt (1882), on the Nile expedition (1884-85), and was promoted to the rank of colonel in 1889. As major general, Herbert was at the head of the militia in Canada for five years (1890-95). In 1906 he entered Parliament as Liberal member for Monmouthshire, and in 1908 he retired from the army.

HERBERT, JOHN ROGERS (1800-90). An English historical and portrait painter, born at Maldon (Essex). He was a pupil of the Royal Academy and exhibited there in 1830, then for some years did illustrating and subject pictures. Of these, "The Appointed Hour" (1834) attracted some attention, and after several successes he went abroad. In 1840 he became a Roman Catholic, and afterward his subjects were chiefly religious. Among his best works are the frescoes in the Houses of Parliament: "King Lear Disinheriting Cordelia," in the Poets' Hall, and a cycle of nine subjects representing "Human Justice" in the Peers' Robing Room. His well-known easel picture, "Sir Thomas More and his Daughter," is in the National Gallery, London; but he is best represented in the Museum of Hamburg, which possesses seven of his works. He was one of the masters in the School of Design in Somerset House (1841) and a Royal Academician (1846). His art is eclectic in style and possesses little power or real technical merit.

HERBERT, MICHAEL HENRY (1857-1903). An English diplomat, the son of Sidney Herbert and Lady Herbert of Lea, known as an author, and brother of the Earl of Pembroke. He entered the diplomatic service in 1888, was appointed chargé d'affaires at Washington, and in 1892 was Secretary of the British Legation there. In 1893 he was made Secretary of Legation at The Hague and thereafter held successively similar positions at Constantinople (1894-97), at Rome (1897-98), and at Paris (1898-1902). In the latter year he was appointed Ambassador from Great Britain at Washington as the successor of Lord Pauncefoot.

HERBERT, SIR THOMAS (1606-82). An English traveler and author, born at York and educated at Oxford and possibly at Cambridge. When he was 21 he set out to Persia with Sir Dodmore Cotton, Ambassador to the Persian King. With letters of safe-conduct from court, Herbert traveled through Persia and made important explorations on his way home. Siding with Parliament in the Civil War, he was commissioned to treat for the surrender of Oxford, and in 1647 was given charge of Charles, whose personality won him to the royal cause. Herbert was the King's constant and sole attendant during his last days and accompanied him to his execution. He was created Baronet after the Restoration. Among his publications are narratives of his travels: *A Description of the Persian Monarchy* (1634), reprinted as *Some Yeares Travels into Divers Parts of Asia and*

Afrique (1638), and his reminiscences (1678) of Charles I's captivity, reprinted as *Memoirs of the Last Two Years of the Reign . . .* (1702, 1813).

HERBERT, VICTOR (1859-). An Irish-American conductor and composer, born at Dublin, Ireland, and a grandson of the famous novelist, Samuel Lover. He was surrounded by musical influences from earliest childhood and at seven years of age was studying music in Germany, in which country he received his musical education. Although trained in the entire range of music, he perfected himself on the cello, and secured his first important engagement as the first cellist of the Court Orchestra at Stuttgart, which, after an interval spent on tour, was followed in 1886 by a similar position with the Metropolitan Orchestra of New York. He afterward played under Thomas, and later Seidl, acting under the latter in the double capacity of cellist and associate conductor. From 1894 to 1898 he was bandmaster of the Twenty-second Regiment (New York City). In 1898 he founded the Pittsburgh Symphony Orchestra, which he conducted until 1904. Meanwhile he had been equally busy with his pen and had published several compositions, chiefly instrumental. Among his comic operas are: *Prince Ananias* (1894); *The Wizard of the Nile* (1895); *The Serenade* (1897); *The Idol's Eye* (1897); *The Only Girl* (1914). His grand opera *Natoma* was produced in 1911 by the Chicago Opera Company; and *Madeleine* (one act) at the Metropolitan Opera House in 1914.

HERBERT OF LEA, SIDNEY HERBERT, first BARON (1810-61). An English administrator, second son of the eleventh Earl of Pembroke. He was born at Richmond, Surrey, Sept. 16, 1810; was educated at Harrow and at Oriel College, Oxford, and entered the House of Commons in 1832 as member for South Wilts, which he represented until his elevation to the peerage in 1861. He began his political career as a Conservative and was Secretary of the Admiralty in Sir Robert Peel's administration from 1841 to 1845, when he became Secretary for War. As a member of this administration, it fell to him to oppose Cobden's motion for a select committee to inquire into the effect of the corn laws on farmers, and afterward to argue in support of the free trade in corn. He went out of office with his party in 1846. In 1852 he was again Secretary for War, in the Aberdeen ministry, and although the sufferings of the army before Sebastopol were laid in a great degree at his door, it was he who sent Florence Nightingale to the Crimea. He was for a few weeks Colonial Secretary in the first administration of Lord Palmerston in 1855, and Secretary for War in his second administration in 1859. Great improvements in the sanitary condition and education of the army, the amalgamation of the Indian with the royal army, and the organization of the volunteer force signalized his army administration. He largely reformed the War Office and was devoting himself with equal zeal and intelligence to his ministerial duties, when, owing to failing health, he resigned his seat in the House of Commons, and in 1861 was called to the Upper House, under the title of Baron Herbert of Lea. He died Aug. 2, 1861. Consult Stanmore, *Sidney Herbert, Lord Herbert of Lea, a Memoir* (London, 1906).

HERBERTSON, HERBERT-SON, ANDREW JOHN (1865-1915). A British geographer, born in

Galashiels, Scotland, and educated at Oxford and at Freiburg-im-Breisgau. He became reader in 1905, and in 1910 professor of geography, at Oxford; was a member of the royal commission on canals and inland waterways in 1906-10; was honorary secretary of the Geographical Association and in 1910 president of the geographical section of the British Association; edited *The Geographical Teacher*, the "Oxford Geographies" and "Oxford Wall Maps"; and wrote: *Man and his Work* (1899), with his wife, who prepared the "Oxford Elementary Geographies"; *Atlas of Meteorology* (1899), with others; *Outlines of Physiography* (1901); *Distribution of Rainfall* (1901); *Commercial Geography* (1903); *Natural Regions of the World* (1905); *Handbook of Geography* (1911). He was general editor of the great *Oxford Survey of the British Empire* (6 vols., 1913-14).

HERBICIDE (from Lat. *herba*, herb + *cædere*, to kill). A name applied to any substance used to destroy weeds. Of the various chemicals that have been successfully and inexpensively employed in weed destruction, dilute solution of carbolic acid, strong brine, copper-sulphate solutions, arsenic, sal soda, arsenate of soda, kerosene, etc., have been most extensively used upon walks, drives, courts, etc., in the destruction of dandelions, plantain, knotweed, ragweed, and various grasses. For best results, salt should be applied dry. At the rate of 300 pounds of crude salt per acre, meadows can be freed from the orange hawkweed, a plant that resists all other methods of destruction. The interesting discovery has been made that some weeds, such as charlock, penny cress, wild radish, shepherd's purse, etc., may be destroyed without permanently injuring the crops among which they grow, by spraying the fields with a solution of copper sulphate (bluestone) at the rate of 40 gallons per acre. The most satisfactory strength of solution to use has been found to be one pound of copper sulphate to four gallons of water. The spraying should be made on a calm bright day, when the weeds have attained only three or four leaves. If the solution be well applied, the weeds will be killed. Iron sulphate (copperas) may be substituted for the bluestone, but then a stronger solution is required, viz., one pound of the salt to a gallon of water. This treatment has been repeatedly tried in England, France, Germany, and the United States with great success. If rain falls soon after the spraying is done, or if the plants have been allowed to become too old, a second application should follow the first within a week or 10 days. Young clover growing in the cereals will not be injured by the treatment. Iron sulphate spray has been demonstrated as very efficient for destroying dandelions in lawns, but several applications must be given and the solution applied with considerable force. Grass may be temporarily blackened, but it soon recovers. Gasoline applied to the centre of the rosettes of leaves of dandelions and chicory will quickly kill the plants. Arsenite of soda has been extensively employed for weed control on plantations in Hawaii.

HERBIVORA (Neo-Lat. nom. pl., from Lat. *herba*, herb + *vorare*, to eat). A term in the old classifications, variously defined and limited, which designated herbivorous as contrasted with carnivorous animals, but ordinarily referred to such as grazed. The term long ago ceased to have any exact significance in science.

HERBOIS, J. M. COLLOT D'. See COLLOT D'HERBOIS.

HERBORT VON FRITZLAR. A German poet of the twelfth and thirteenth centuries, so called from his residence at Fritzlar in Hesse. He was somewhat read in the classics and was probably in orders. He wrote the *Liet von Troie* (18,458 verses), a poetic version of the Trojan War, and the oldest extant German work on that subject, following rather freely the *Roman de Troie* of Benoît de Sainte-More. The work is in the four-stressed rhymed couplets. The language is Middle German, and the poem is coarser and more realistic than the later court epics. There are some worthy passages, such as the address of Achilles to the dead Hector. Perhaps Herbort von Fritzlar is to be identified with a Herbort who appears as the author of a drama, now lost, on St. Otto. Frommann published *Herborts von Fritzlar Liet von Troie* in 1837. Consult: Dunger, *Die Sage vom trojanischen Kriege in den Bearbeitungen des Mittelalters* (Leipzig, 1869); Fischer, *Der alt-französische Roman de Troie des Benoît de Sainte-More als Vorbild*, etc. (Paderborn, 1883).

HERB ROBERT. A common weed. See GERANIUM.

HERBS, CULINARY, and SEASONING VEGETABLES. Aromatic or highly flavored plants or parts of plants used in the preparation of foods for the table. The plants popularly employed owe their flavoring properties to volatile oils, which in most instances are derived from the leaves or leafstalks, either fresh or cured; in other cases the seed is utilized; in others, the flower or the root. Familiar examples of leaves are sage, mint (spearmint), savory, thyme, and marjoram; of leaves and stalks, celery, leeks, and chives; of buds and flowers, capers and saffron; of root portions, onions, garlic, and horse-radish; of seeds, dill and caraway; and of fruits, tomato and green and ripe garden peppers, both sweet and sharp. Edible fungi, like seasoning vegetables, are used for food purposes as well as for seasoning. The most prized of these is the truffle, one of the most costly seasonings. Mushrooms are a common seasoning. Seasoning vegetables are grown like other garden vegetables. Most seasoning herbs may be grown from seed in the garden, and many of them—parsley, chives, mint, etc.—in boxes of good soil on a sunny window sill. No special care is necessary, except to remove weeds and to keep the surface of the soil loose. When well established, the leaves may be gathered without injury to the plants. By spreading the leaves and tops of such herbs as sage, savory, thyme, etc., thinly upon trays in a heat not exceeding 120°, and occasionally turning them, they will soon be dry enough to pulverize—an operation generally performed by rubbing between the hands. Celery leaves trimmed off when celery is served on the table may be dried in the same way. The powder will keep well in air-tight jars, but poorly in paper or paste-board packages, because the paper absorbs the oil and permits its escape into the air. Herbs may also be preserved in alcohol or vinegar. When this method is employed, a jar is filled with leaves, and enough of the liquid added to cover them completely. After standing a few days the liquor will be ready for use. Tarragon vinegar, very often used in making salad dressing, is perhaps the best known of these products. Dried sage, savory, marjoram, and similar herbs

are generally used where the presence of specks is not objectionable, as in dressings, stews, soups, etc.; home-made or commercial extracts in clear sauces, and the fresh herbs in salads. Custom has much to do with the use of savory herbs and seasoning vegetables. In general they are more commonly employed in continental than in English and American cooking. Parsley, sage, onion, celery, and mint (spearmint) are more common seasoning herbs in the United States and England than are savory, borage, garlic, basil, and saffron. These statements apply to home cooking, for the methods of professional cooks are much the same in all countries. Some herbs once much prized are seldom used to-day. For instance, tansy was once a common herb in English cooking. Savory herbs and seasoning vegetables are used in soups, salads, stuffing (forcemeat), made dishes, sauces, etc., as well as in cheese making (sage cheese) and pickle making (e.g., dill pickles made by fermenting cucumbers with dill seeds in a salt brine). Savory herbs are seldom used in sweet foods to-day, though they were once quite common, as old cookbooks show.

The intelligent use of seasoning herbs and vegetables should be encouraged, as it offers a simple and easy way of making the diet palatable and varied. It is often an economy as well, as in the making of savory dishes from left overs. The seasonings add little to food value, but much to palatability. The use of herbs and seasoning vegetables is discussed in connection with the preparation of foods in most of the standard cookbooks. Individual taste, however, has much to do with the quantity and kind used. Consult: Bardswell, *The Herb Garden* (London, 1911); French, *How to Grow Vegetables and Garden Herbs* (New York, 1911); Kains, *Culinary Herbs—Their Cultivation, Harvesting, Curing, and Uses* (ib., 1912). See VEGETABLES.

HERBST, hērpst, EDUARD (1820–92). An Austrian jurist and statesman, born in Vienna. He was professor of criminal law and the philosophy of law at Prague in 1858, was elected a deputy to the Bohemian Diet, and then, in accordance with the February patent of 1861, was elected by the Diet to the Lower House in the Austrian Reichsrat, where he became one of the most conspicuous leaders of the German Liberal, or Constitutional, party. In 1867 he was appointed Minister of Justice in the Liberal cabinet (Bürgerministerium) of Prince Carlos Auersperg. As such, he introduced a number of important reforms—among them the abolition of imprisonment for debt, the introduction of the jury in libel suits against the press, the organization of the district courts, important finance measures, and, above all, the confessional ordinances of 1868. In 1870 his party lost its control of the government, and he led the opposition in the Reichsrat in its attacks on the ministries of Potocki and Hohenwart, until the fall of the latter in October, 1871, brought the German Constitutional party once more into power, when he became a leader of the government forces in the Lower House. In the latter years of his life, during the Taaffe régime, Herbst lost much of his former influence because of a split in his former compact party. Among his writings may be mentioned his *Handbuch des österreichischen Strafrechts* (7th ed., 1882–84).

HERCHER, hēr'kēr, RUDOLF (1821–78). A German Hellenist. He was born at Rudolstadt

and, after studying at Jena, Leipzig, and Berlin, was appointed to a professorship at the Joachimsthal Gymnasium in Berlin (1861). In 1873 he was made a member of the Berlin Academy of Sciences. His works, which are distinguished by critical accuracy, include editions of *De Fluviis* (1851), which he proved had not been written by Plutarch; Arrian's *Scripta Minora* (1854; 2d ed., by Eberhard, 1885); *Scriptores Erotici Graeci* (2 vols., 1858–59); *Ælian* (1858); the *Oneirocritica* of Artemidorus (1864); Plutarch's *Moralia*, vol. i (1872); the *Epistolographi Graeci* (1873); Apollodorus' *Bibliotheca* (1874). His *Homörische Aufsätze* on the topography of Ithaca were collected by C. Robert (1881).

HERC'TE. A mountain in Sicily. See HAMILCAR, 7.

HERCULANEUM, hēr'kū-lā'nē-ūm (Lat., from Gk. Ἡράκλειον, *Hērakleion*, city of Hercules, from Ἡρακλῆς, *Hēraklēs*, Hercules). An ancient city of Italy, situated at the northwestern base of Mount Vesuvius, about 5 miles east of Naples, a short distance from Pompeii. It was doubtless founded by Oscans, but Etruscans seem to have gained a foothold there. It subsequently was conquered, with all the rest of Campania, by the Samnites, and later it fell into the hands of the Romans. In 63 A.D. the city was seriously injured by a violent earthquake; and in 79 it was buried, along with Pompeii and Stabiae, by the memorable eruption of Vesuvius (q.v.). It now lies at a depth of from 30 to 120 feet below the surface, owing to successive eruptions of later days, and is filled up and covered with volcanic tufa, composed of *lapilli* and ashes, and consolidated to some extent by water, which is often thrown up in great quantities during volcanic eruptions. Above it, on the modern surface, are the two large villages Portici and Resina. The very existence of Pompeii had been forgotten, but knowledge had never been lost of the burial place of Herculaneum. Finally, in 1719, an Austrian general, Count Elbeuf, sank a shaft which fortunately struck the ancient theatre, from which centre some tunneling was done, and objects of interest were discovered. But after a short time the government stopped the work till 1738, when explorations were begun under royal authority, that of Charles IV of Naples. From that time excavations have been carried on intermittently, being far more difficult than in Pompeii; for the greater part of the city lies deep under the modern villages, and work must be done by tunneling through a troublesome tufa, which needs constant support lest the vaults collapse, and with them the foundations of the houses above. Hence visitors can see only a very small portion of this entombed city. The chief edifice shown is the theatre, which was built but a short time before the fatal eruption. It has 16 rows of stone seats and could accommodate about 3000 persons. A part of the Forum, with adjacent buildings, some private houses, two small temples, and a villa have also been discovered; and from these buildings many beautiful statues, in both marble and bronze, especially the latter, and remarkable paintings have been obtained. The art relics of Herculaneum far exceed in value and interest those found at Pompeii. These are to be seen in the Museo Nazionale at Naples. Most remarkable was the discovery in the villa of over 1800 rolls of manuscript on papyrus,

charred into a coallike condition by their long burial under moist earth. About 350 of these have been unrolled; of these about 200 have been published, e.g., in *Herculaneum Volumnum quæ Supersunt* (Naples, 1793-1809; 2d series, 1862-76; vol. i of the 3d series appeared at Milan, 1904). These contain works by Epicurus, Chrysippus, and others. (Consult also *Fragmenta Herculaneisia*, Oxford, 1886.) In 1905 Prof. Charles Waldstein (q.v.) again awakened interest in the site by a proposal for excavations to be conducted under international auspices. In 1906, after long negotiations, the Italian government determined to excavate the buried city, following in principle Professor Waldstein's plan, but keeping the control of the excavations in Italian hands. The scheme was to leave the modern village now over the site undisturbed, and by preserving the crust of lava to create in the buried city as it were an underground museum; but difficulties with landowners at Resina soon caused the abandonment of the work. Consult: Ruggiero, *Storia degli scavi di Ercolano* (Naples, 1885); Waldstein and Shoobridge *Herculaneum, Past, Present, and Future* (London, 1908), which gives a full account of the excavations; Barker, *Buried Herculaneum* (New York, 1908); Baedeker, *Southern Italy and Sicily* (16th Eng. ed., Leipzig, 1912).

HERCULANO (âr'kûl-lâ'no) **DE CARVALHO E ARAUJO, ALEXANDRE** (1810-77). A Portuguese poet and historian, born in Lisbon. In 1828, to escape the despotism of Dom Miguel, he went to Paris and two years afterward to London. In 1832 he returned to Lisbon, joined the Liberal party, and gained much fame as an editor of *Panorama*. His *Poesias* (1850), including *A voz do propheta* and *A harpa do orente*, the latter of religious and political importance, were followed by the historical novels: *Eurico, o Presbytero* (1847); *O monge de Cister* (1848); *O Bobo*; *Lendas e narrativas* (1851). In 1845, as librarian at Ajuda, he began his historical work. The *Historia de Portugal* (1846-53) is an authority on Portuguese history to the end of the thirteenth century; equally important are: *Da origem e estabelecimento da inquisicao em Portugal* (1854-55); *Questões publicas* (1873); *Controversias e estudos historicos* (1876-84). As a member of the Lisbon Academy, Herculano edited *Portugalia Monumenta Historica*. Consult Pimentel, *Herculano e o seu tempo* (Lisbon, 1881), and Romero Ortiz, *La literatura portuguesa en el siglo XIX* (Madrid, 1869).

HERCULES, hêr'kû-lêz. A northern constellation, situated between Lyra and Boötes. It contains no stars brighter than the third magnitude, but has several interesting double stars. α Herculis is a variable which oscillates between magnitudes 3.1 and 3.9; its components form a contrasting pair—the one reddish orange, the other emerald green. ζ Herculis, a binary discovered by Herschel in 1782, has yellow and blue components of the third and sixth magnitudes respectively; its period is about 35 years. 95 Herculis is notable for the color changes which it has undergone since it was first observed by Herschel in 1780; its two components, each of magnitude 5.5, were then bluish white and white respectively, changed to orange and green about 1855, and are now both pale yellow. The most interesting object in this constellation is the globular cluster, *Messier 13*, the finest in the northern heavens.

HERCULES (Gk. Ἡρακλῆς, *Hēraklēs*, also known at Thebes as Ἀλκαῖος, *Alkaios*, and frequently in literature called Ἀλκείδης, *Alkeidēs*, or Alcides, i.e., descendant of Alcaeus, father of Amphitryon; Lat. *Hercoles*, *Hercles*, *Hercules*). The typical hero of Greek myth and the subject of numberless legends. In general, these may be conveniently treated in three groups, centring in Thebes, Argos, and Mount Eta, near Thermopylae, and corresponding to the birth, the middle life, and the death of the hero. Thebes seems to have been generally recognized as the birthplace of Hercules, and Amphitryon, the husband of Alcmena, is certainly a Boeotian hero; but when Argos had become the centre of his life it was necessary to connect his parents with that region, and so both Alcmena and Amphitryon become descendants of Perseus and are represented as exiles from Tiryns, living at Thebes. According to the common story, during the absence of Amphitryon, Zeus came to Alcmena in her husband's form, and by him she became the mother of Hercules, while by Amphitryon she conceived his twin brother Iphicles. The jealous Hera, the enemy of Hercules throughout his life, because he was son of Zeus by a mortal mother, sent two serpents to destroy the infants in their cradle; but the hero, who had been gifted by Zeus with superhuman strength, strangled them (see, e.g., Plautus, *Amphitruo*, 1107-19. This play deals throughout with the Amphitryon-Alcmena-Hercules story). Thebes is also the scene of the madness of Hercules, immortalized by Euripides in his play *The Mad Hercules*. In this fit he killed his children—and, in some versions, his wife, Megara—and was ordered by the Delphic oracle to expiate his crime by serving Eurystheus (q.v.), King of Argos or Mycenæ. This feature seems much like an addition to bring the Theban hero into Argolis, and it is quite probable that the original Theban legend contained many exploits afterward transferred to Peloponnesus. The killing of the lion of Mount Cithæron can scarcely be other than a variant of the first labor. At Argos the central feature is the servitude to Eurystheus, to which Hercules was bound even before his birth by a trick of Hera. In this version Zeus had sworn that the sovereignty of the realm of Perseus should pass to the son of Amphitryon or the son of Eurystheus, as one or the other should be born first. Hera delayed the birth of Hercules, and the sovereignty passed to Sthenelus, son of Eurystheus. To this servitude belongs a series of "labors," which were gradually fixed into a canon of 12. The exact date when this was brought about is uncertain. It can scarcely be due to an early epic, for even in the fifth and fourth centuries there is no hard and fast line between the "labors" and the other deeds, and the final classification appears first for us in the mythographers of Alexandria, who also arranged the *parerga* (side deeds), i.e., the other deeds, over and above the "labors," attributed to the hero in appropriate places in the cycle. Traces of an earlier cycle of 10 labors are perhaps to be found in the story that, because in the second labor Hercules had the aid of Iolaus, and in the fifth concealed from Augeas that he was performing the command of Eurystheus, the latter refused to count these and required the performance of the eleventh and the twelfth.

The first labor was to destroy the lion which haunted the forests of Nemea and Cleonæ and

could not be wounded by the arrows of a mortal. Hercules boldly attacked him with his club, but in vain, and he was finally obliged to strangle him with his hands. From this time he wore the lion's skin as armor. The second was to destroy the Lernean hydra with its many heads, which he accomplished with the assistance of his friend Iolaus. (See HYDRA.) His third was to catch the Arcadian hind of Diana, famous for its swiftness, its golden horns, and its brazen feet. The fourth was to bring alive to Eurystheus a wild boar which ravaged the neighborhood of Erymanthus (q.v.). The fifth was to cleanse the stables of Augeas (q.v.), King of Elis, where 3000 oxen had been confined for many years—a task which he accomplished in one day by turning the river Alpheus, or Peneus, through the stables. His sixth was to destroy the carnivorous birds, with brazen wings, beaks, and claws, which ravaged the country near Lake Stymphalus in Arcadia. The seventh was to bring alive to Peloponnesus a bull, remarkable for beauty and strength, which Poseidon had given to Minos, King of Crete, upon his request, in order that he might sacrifice it. When Minos afterward refused to sacrifice the bull, Poseidon made it mad, and it laid waste the island. Hercules brought the bull on his shoulders to Eurystheus, who set it at liberty. It appears again as the Marathonian bull in the story of Theseus (q.v.). The eighth labor was to obtain the mares of Diomedes, King of the Bistones in Thrace, which fed upon human flesh. The ninth was to bring the girdle of Hippolyta, Queen of the Amazons. The tenth labor was to kill the triple-bodied monster Geryon (q.v.) and bring his herds to Argos. The eleventh was to obtain the golden apples from the garden of the Hesperides (q.v.). Atlas, who knew where to find the apples, brought them to Hercules, who meanwhile supported the vault of heaven; but, according to others, Hercules went himself and stole the apples, after slaying the dragon who guarded them. The last labor was to bring from the infernal regions the three-headed dog Cerberus (q.v.). Hades promised him Cerberus on condition that he should not employ arms, but only force. When Hercules had brought the monster to Eurystheus, the latter, pale with fright, commanded him to be removed. Hercules set him at liberty, whereupon Cerberus immediately sank into the earth. Hercules was now free from his state of servitude.

Into the cycle of "labors" are wrought many of the *parerga* performed by Hercules in his wanderings. Thus, the battle with the centaurs, a favorite subject in archaic art, was localized at Pholoe in Arcadia and connected with the chase of the Erymanthian boar. On his journey to Thrace for the horses of Diomedes he was entertained by Admetus (q.v.), and, after wrestling with Death, restored to him from the grave his wife, Alcestis. The tenth and eleventh labors, with their long journeys, gave opportunity for many scenes. The hero voyages towards the western home of Geryon in a bowl given him by the Sun, and on his return through Italy kills the robber Cacus (q.v.), who stole his cattle, and dedicates the *Ara Maxima* at Rome. While in search of the apples of the Hesperides, he wrestles with Nereus, the Old Man of the Sea, slays in Libya the giant Antæus (q.v.), by his strength escapes from the Egyptian King, Busiris, who seeks to offer him as a sacrifice, and frees Prometheus (q.v.) from his

captivity. He frees from Hades the captive Theseus (q.v.). During the period of freedom from Eurystheus we find that Hercules was one of the Argonauts (q.v.), and engaged in an expedition against Troy, because, after he had freed Hesione from a sea monster, her father, Laomedon, had refused him the promised reward. In this period was also placed another fit of madness, in which he killed his friend Iphitus and was in consequence required to serve the Lydian Queen, Omphale.

The legends that cluster about Mount Ceta are concerned with the death of the hero. He had won Deianira, daughter of Eneus of Calydon, by overcoming his rival, the river god Achelous. With her he now repaired to Trachis. Having arrived at the river Evenus, he encountered the centaur Nessus. Hercules passed through on foot; but Nessus, under pretense of carrying Deianira over, attempted to offer her violence, whereupon Hercules slew him with an arrow dipped in the poison of the Lernean hydra. Nessus, before expiring, instructed Deianira that a robe dipped in his blood would prove an infallible philtre to regain her husband's love. The hero now made war against Eurytus, King of Œchalia (who had defrauded him), slew him and his sons, and carried off his daughter Iole. Thence he went to Cænæon in Eubœa and erected an altar to Zeus Cænæos. In order to celebrate the rite with due solemnity, he sent Lichas to Trachis for a white garment. Deianira, being jealous of Iole, anointed the robe with the philtre she had received from Nessus. Hercules put it on, and immediately the poison penetrated his bones. Maddened by the terrible pain, he seized Lichas by the feet and flung him into the sea. He tore off the robe, but it stuck to his flesh, which was thus torn from his bones. In this condition Hercules was conveyed by sea to Trachis, and Deianira, being informed of what had occurred, destroyed herself. Hercules himself repaired to Mount Ceta, where he erected a funeral pile, and, ascending it, commanded that it should be set on fire. The burning pile was suddenly surrounded by a dark cloud, in which, amid thunder and lightning, Hercules was carried up to heaven. There he became reconciled to Hera and married Hebe.

Popular legend represented the great, patient, suffering hero as fond of good cheer and relaxation in his hours of rest, and thus in the comedy of Attica and Magna Græcia Hercules was frequently introduced as a jovial sensualist, whose intellectual powers are by no means equal to his physical. Something of this conception appears also in the *Alcestis* of Euripides.

In Greek art, from the earliest times Hercules is a favorite figure. His labors adorned the metopes of the temple of Zeus at Olympia and the treasury of the Athenians at Delphi. His statues are numerous. Scopas seems to have represented him in youthful vigor, but in the Hellenistic period the type is that of a bearded man, of athletic build, often with the muscular development carried to excess, as in the Farnese Hercules of Glycon, which perhaps is based on a work of Lysippus.

The worship of Hercules was early introduced into Rome. (See above, the reference to the story of Geryon.) Probably the worship was brought to Rome from Greek colonies in Etruria and in Magna Græcia. He was worshiped especially at Tibur. He was patron of athletes and gladiators.

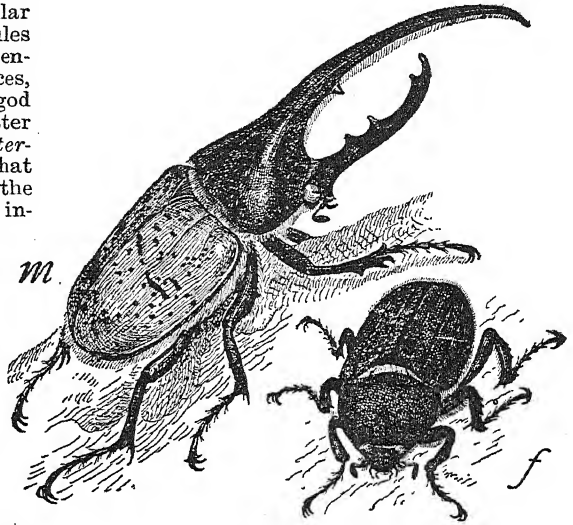
As to the nature and origin of Hercules, there has naturally been the widest diversity of opinion. Some, following the later Greek identification with the Phœnician Melqart, and the resemblances to the Babylonian hero Gilgames, have seen only a Semitic deity adopted by the Greeks. In this view he is a sun god or a solar hero. It seems clear that the story of Hercules in its earliest features is pure Greek; the Oriental elements are, to judge from our sources, later accretions. Whether the hero or the god is the original form is, however, still matter for debate. E. Meyer (*Geschichte des Alterthums*, ii, Halle, 1894) has pointed out that Attica, Bœotia, and the Achæan colonies are the seat of the divine worship of Hercules, and insists that he is originally a nature deity, who, like many others, partakes of the changes of nature, now triumphant, now suffering, and that under the Dorian influence, and especially literary tradition, the god sank to the hero. On the other hand, U. von Wilamowitz-Möllendorff holds that in Hercules we have the perfect ideal of the Dorian man, who became a divinity to the tribes with whom the Dorians were in contact. Much can be said in favor of both views, and a positive decision between them is not as yet attainable; but it must be admitted that the degradation of a god to a hero seems common in the development of Greek mythology, while the reverse is by no means so clearly proved a process.

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HERCULES, PILLARS OF (Gk. Αἱ Ἡρακλέους Στήλαι, *Hai Hērakleous Stēlai*, Lat., *Herculis Columnæ*). The name given by the ancients to the two rocks forming the entrance to the Mediterranean at the Strait of Gibraltar, Calpe (Gibraltar) in Europe and Abyla (Ceuta) in Africa. Their erection was generally ascribed by the Greeks to Hercules (q.v.), on the occasion of his journey to the Kingdom of Geryon. According to one version of the story, they had once been united, but Hercules tore them asunder, to admit the flow of the ocean into the Mediterranean; another version represents him as causing them to unite temporarily, in order to form a bridge. The first author who mentions them is Pindar, who seems to connect them with Cadiz. In later times there was much discussion as to their exact location, and especially as to whether they were to be identified with the promontories at the strait, or to be sought in islands, or were pillars erected by Hercules.

HERCULES BEETLE. A scarabid beetle (*Dynastes hercules*), remarkable not only for its great size (5 inches long), but for the singular appearance of the male. An enormous horn

projects from the thorax, and is opposed by a similar but smaller projection of the head, the whole resembling a pair of great but unequal pincers. It is a native of Brazil. Two species occur in the United States. *Dynastes tityrus* is



HERCULES BEETLE.
m, male; f, female.

a large greenish-gray species of the Southern States; *Dynastes granti*, of the Far West, has a much larger thoracic horn than the former. Cf. GOLIATH BEETLE.

HERCULES' CLUB, ANGELICA TREE. See ZANTHOXYLUM.

HERCULES' CLUB GOURD. See BOTTLE GOURD.

HERCULES OF THE UNITED STATES BANK. See CHEVES, LANGDON.

HERCULES POWDER. See EXPLOSIVES.

HERCYNIAN FOREST (Lat. *Hercynia Silva*). A name variously applied by the ancient writers to portions of the central mountain system of Europe. Aristotle makes the Ister (or Danube) and the other great northern rivers take their rise in the Hercynian Forest. Cæsar, who estimates it at nine days' journey in breadth and 60 in length, comprehends under this name a great part of the mountain ranges in Germany north of the Danube; while some identify it with the Bohemian Forest, and others with the Thuringian Forest. Some geographers apply the term to the complex of mountain ranges, mountain groups, and plateaus which stretch from Westphalia across middle Germany and along the northern borders of Austria to the Carpathians.

HERD, DAVID (1732-1810). A Scottish collector of national ballads. He was born in the Parish of Marykirk, Kincardine, where his father had a farm, but early left the country for the town and became a well-known figure among the literary men of Edinburgh. His claim to remembrance rests upon his *Ancient and Modern Scottish Songs, Heroic Ballads, etc.* (2 vols., 1776), of which a modern edition was published in Glasgow in 1869.

HERDER, hër'dër, BARTHOLOMÄUS (1774-1839). A German publisher, born at Rottweil in Württemberg. In 1801 he opened a bookstore and printing office in Meersburg on Lake Con-

stance, but soon afterward removed to the city of Constance, and in 1810 to Freiburg, Baden, where he opened the Herdersche Universitätsbuchhandlung. He accompanied the allies to Paris in 1815 as Imperial field printer in Metternich's suite, and on his return added to his printing business establishments for lithography, copper engraving, and plastic art. The Catholic character of the firm was developed under his sons and successors, Karl Raphael Herder and Benjamin Herder, and it became one of the best-known publishing houses of this church in Germany. In 1888 Hermann Herder, a son of Benjamin and grandson of the founder, inherited the business, which became known as the Herdersche Verlagshandlung. The firm also established an office at St. Louis, Mo., U. S. A. Among the important works which the firm has published are *Wetzer und Welte's Kirchenlexikon oder Encyclopädie der katholischen Theologie* (12 vols., 1847-56; 2d ed., 1882-1901) and *Herders Konversations-Lexikon* (9 vols., 1905).

HERDER, JOHANN GOTTFRIED VON (1744-1803). An eminent German philosopher, critic, and theologian, of the classical period, born at Mohrungen in East Prussia. He was the son of a schoolmaster and cantor. His frail health unfitted him for industrial life, and his first earnings were as copyist to Deacon Trescho, a voluminous but forgotten author. Here he was neither appreciated nor justly treated, but he gained a knowledge of books and an easy style. He had begun independent composition when he awakened the interest of a Russian surgeon, with whom he went to Königsberg to study medicine; but for this study his nerves proved too weak, and he turned to theology, getting a small scholarship and eking out a livelihood by teaching. He soon won notice both as teacher and preacher and became acquainted with Kant the philosopher, who, with Rousseau, was the guide of his future metaphysical speculations. In 1764 he accepted a call to the Cathedral School at Riga, where he maintained his reputation and would have remained had he not become involved in a literary controversy with Klotz about Lessing, in the course of which he denied the authorship of articles which he had written. His desire to travel was thus strengthened by the situation in Riga, and he left for France in June, 1769. Too poor to remain longer abroad, he returned to Germany in that year, glad to become tutor to the Prince of Holstein-Eutin. He spent a profitable fortnight with Lessing at Hamburg, found at Darmstadt his future congenial mate in Karoline Flachsland, and accepted a call to the pastorate of Bückeberg. But he spent the winter of 1770-71 in Strassburg for an operation on one of his eyes (unsuccessful), during which time he was a helpful friend and critic of the young Goethe, who was finishing his law studies at the university. He then went to Bückeberg. He had printed the famous critical attacks on the artificial literary spirit of his time, *Fragmente über die neuere deutsche Litteratur* (1767) and the *Kritische Wälder* (1769), and a prize essay, *Ueber den Ursprung der Sprache* (1772). He now began to gather material for the *Ideen zur Philosophie der Geschichte der Menschheit*, his greatest work, though unfinished, published 1784-91 (translated by Churchill), for *Älteste Urkunde des Menschengeschlechts* (1774), an æsthetic study of Genesis, and for the studies in folk poetry (*Volkslieder*, 1778-79), the works

that were to constitute his chief title to fame. In 1773 he married. In 1776 Goethe procured for him the posts of superintendent of the church district of Weimar, court preacher, and member of the upper consistory at Weimar, where he found the environment best suited to his delicately organized genius and labored effectively for Church reform, though he soon found himself gradually becoming estranged from Goethe and his associates. Many of Herder's important publications were completed in the period between 1778 and his journey to Italy in 1788. They consist of theological, æsthetic, philosophic, philologic, and political studies, of *Vom Geiste der ebräischen Poesie* (1782; trans. by Marsh, *The Spirit of Hebrew Poetry*, 1833), of a paraphrase of *The Cid* (1805), and of *Stimmen der Völker* (Voices of the Peoples, 1778-80), in which he translated the popular songs of many nations with a felicity and sympathy that preserve in wonderful degree the local color and feeling. Herder's original work in æsthetics, philosophy, literature, and philology has powerfully influenced German thought. He was possibly best as an interpreter of others; for he had a truer perception of the relation of language to human nature and national character than any other of his day. He was considered, if not a systematic, a most stimulating thinker, perhaps more a seer than a scholar, yet by the scope of his intuitional perceptions he abounded in suggestions that have borne fruit in the modern correlation of the sciences. The best critical edition of Herder's complete works is that of B. Suphan in 33 volumes (1877-1909). The literary portion has been also reëdited by Suphan and Redlich (9 vols., Berlin, 1884 et seq.). For Herder's biography, consult his widow's *Erinnerungen aus dem Leben Johanns Gottfried von Herders* (Stuttgart, 1830), *Lebensbild*, by his son Emil (Erlangen, 1846-47), and his *Letters* (ib., 1846-48). There are lives by Haym (Berlin, 1877-85), Kühnemann (Munich, 1895), Bürkner (Berlin, 1904), and in English by Nevins (London, 1884).

HERD'S GRASS. See REDTOP GRASS.

HEREDIA, á'râ'de'á', JOSÉ DE (1842-1905). A French poet, of Spanish parentage, born at Santiago de Cuba. He was the most talented disciple of Leconte de Lisle (q.v.), and one of the greatest masters of the French sonnet. His sonnets are the supreme result of the cultivation of form that the French call Parnassian, very picturesque and as impersonal as lyric poetry can be. Leconte de Lisle was not quite impassive in his pessimism, but in Heredia's work one perceives of the author only the expansion of the heart towards beauty and heroism. The immediate response of the public to the 50 sonnets of *Les trophées* (1893) was significant of the revival of stricter classical taste in a reaction against the fantastic license of the Symbolists and the followers of Baudelaire (q.v.). Heredia's poems resemble Gautier's in polish. They show the reticences of the conscious artist and a vague suggestion of the subjective. He was the most condensed, plastic, and precise stylist of modern France—rich in suggestions of color and melody, incomparable in the union of sonorousness and compression. His subjects reflect in the main the scenes and traditions of his youth at Havana rather than those of his later studies at the Ecole des Chartes. The heroic epoch of Spanish conquest was his most inspiring theme, and he used it also in his sole

picaresque prose romance, *La nonne Alferéz* (1894), and in a translation of Bernal Díaz's *Chronicle*. But he is often superb in merely exotic description, as in the brilliancy of *Récit de corail* or the splendor of *Blason céleste*. Heredia was elected a member of the French Academy in 1894. There is a translation of the sonnets into English blank verse in Frank Sewall's *The Trophies* (Boston, 1900). Consult Ernest-Charles, *De Hugo à Mistral* (Paris, 1902), and A. Medeleine, "Chronologie des sonnets de Hérédia," in *Revue d'histoire littéraire* (ib., 1912).

HEREDIA Y CAMPUZANO, é kām-pōō-zā'nō, JOSÉ MARÍA DE (1803-39). A Cuban lyric poet, born in Santiago de Cuba, Dec. 31, 1803. His father and mother were from Santo Domingo. Very early Heredia was taken to Florida, then to Santo Domingo, and in 1812 to Venezuela. At the age of 10 he began to study philosophy in Caracas, whence he went to Mexico. He returned to Cuba in 1817 and entered the University of Havana. Beginning the practice of law at Matanzas, he became involved in a conspiracy and was forced to flee, after which he was condemned by the government to perpetual exile (1823). He spent the next two years traveling in the United States, and making a scanty livelihood by his poems and by giving lessons in Castilian. After 13 years of banishment Heredia sought and obtained permission for a three months' visit to his mother and sisters at Matanzas. Heredia died at Toluca, Mexico, May 12, 1839. Though he is much less gifted than his cousin, the French sonnetist, José de Heredia (q.v.), still he is one of Cuba's great poets and the first poet of the patriotic group. Heredia's Spanish is remarkably pure. His verses are often rhetorical, sometimes crude, and one is continually impressed by the weakness and the vanity of their author; nor is there ever any great power in Heredia's reasoning, but his verses are often imaginative, and they reflect the melancholy of exile. Their tropical coloring initiated a brilliant epoch in the poetry of Cuba, not only making his name widely popular in all Spanish-speaking countries, but also causing his poems to be translated into the principal tongues of the civilized world. The foremost Spanish critics, as well as distinguished French and English writers, among them Longfellow, paid high tribute to the lyrical productions of the Cuban poet. They passed through numerous editions. His best-known poem is the ode *Al Niágara*, a "most beautiful piece of American verse," which has been translated into many languages. Besides rendering into Spanish verse several dramas by famous French and Italian authors, such as Voltaire, Chénier, Alfieri, and others, he published, in 1830-31, *Lecciones de historia universal*, a work distinguished by lucidity of style and profundity of ideas, entitling its author to an honorable place among Latin-American historians.

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HEREDITAMENT (ML. *hereditamentum*, from Lat. *hereditare*, to inherit, from *heres*, heir). In English law, a comprehensive term

including everything that goes to the heir at law. Hereditaments are regularly classified as corporeal and incorporeal. A house or land held in freehold is a corporeal hereditament; while tithes, advowsons, profits à prendre, and even future estates in land are incorporeal, being dealt with in our legal system as impalpable rights enjoyed in corporeal things. The term most frequently appears in the phrase "lands, tenements, and hereditaments," technically used by Blackstone and other common-law writers to denote every species of real property. "Hereditaments" is the most comprehensive term of the three, as it includes not only lands, but incorporeal interests, such as those above referred to, and not only tenements, but such things as heirlooms. (See **HEIRLOOM**.) On the other hand, it does not include interests in lands, such as leasehold estates and life estates, which do not descend to the heir. See **HEIR**; **REAL PROPERTY**.

HEREDITY. Heredity is the measure of resemblance due to common descent. It is otherwise defined as follows: 1. "The influence of parents upon offspring; transmission of qualities or characteristics mental or physical, from parents to offspring." (*Century Dictionary*.) 2. "Understood in its entirety, the law is that each plant or animal, if it reproduces, gives origin to others like itself; the likeness consisting not so much in the repetition of individual traits as in the assumption of the same general structure." (Herbert Spencer, *Principles of Biology*, vol. i, p. 301.) "The phenomenon of correlation in the deviations of blood relatives from the mean."

It is difficult to define a term that comprises under a single conception so large a range of phenomena. Resemblances between parents and offspring, brothers and sisters and near relatives generally, are examples of heredity; but according to the law of descent (evolution) all living things are related by common descent, and therefore the laws of heredity apply to all organisms in proportion to the nearness of relationship.

To study heredity it is necessary to compare corresponding characters, and apparently there may be an indefinite number of these, according to the minuteness of comparison. But it is found that the minuter characters are usually associated and are inherited in groups. These constitute the unit characters of a modern school of biologists (mutationists) who regard the organism as a mosaic of unit characters, which recur in different combinations in related species, and which are as sharply separated from one another as the molecules of chemistry. This conception is obviously radically at variance with the idea of blending and gradual separation of characters that has hitherto been current.

In any case inheritance can be studied only by comparison of characters considered singly, whether these are actual units or arbitrary subdivisions.

Corresponding characters of parents may appear in offspring in one of three different ways: 1. *Blending Inheritance*: in such cases the character of the offspring is intermediate between the corresponding parental characters, e.g., inheritance of color in the mating of a negro and a white person—the offspring is mulatto, i.e., intermediate. 2. *Alternative, or Exclusive, Inheritance*: the character of one parent is inherited to the exclusion of the corresponding character of the other, e.g., the offspring of a gray and a

white mouse is gray. In such cases the character that appears is known as the *dominant* character; that which fails to appear, the *recessive* character. 3. *Particulate, or Mosaic, Inheritance*: in such cases (relatively rare) maternal and paternal characters are intermingled but not blended in the offspring.

The distinction between blending and alternative inheritance is, on the whole, a fairly sharp one, especially in the case of hybrids, where it can best be studied, owing to contrast in the corresponding parental characters. It is doubtful, however, if the dominance of one character is ever absolute; certainly it is often only relative. Thus, the distinction between blending and alternative inheritance is not an absolute distinction, and does not imply any difference in the laws of inheritance.

Cases in which the filial form of a character is unlike its form in either parent are not uncommon and have to be recognized in any theory of inheritance.

Inheritance does not follow fixed, unvarying laws like those of phenomena due to simple causes, but the data of heredity, when formulated in a statistical manner, are found to conform to certain general principles. These are, it must be confessed, only very partially known at the present time. There can be no doubt that the phenomena of heredity are capable of as exact a formulation as any other phenomena of equal complexity; but the data have been studied in a consistent, experimental, and statistical manner only relatively recently, and our knowledge is therefore growing rapidly and not fully formulated. Some of the more general results may be stated: 1. The influence of the two parents is, on the whole, equal in heredity. This comes out clearly from the fact that reciprocal crossings are, on the whole, similar, or, in general terms: $a\sigma \times b\sigma = a\sigma \times b\sigma$. 2. The law of *ancestral inheritance*, as stated by Galton (*Nature*, vol. lvii, p. 293, London, Jan. 27, 1898), is as follows: "The total heritage of the offspring is derived as follows: The two parents between them contribute on the average one-half of each inherited faculty, each of them contributing one-quarter of it. The four grandparents contribute between them one-quarter, or each of them one-sixteenth, and so on; the sum of the series $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{16}$, etc., being equal to 1, as it should be. It is a property of this infinite series that each term is equal to the sum of all those that follow: thus, $\frac{1}{2} = \frac{1}{4} + \frac{1}{8} + \frac{1}{16}$, etc., $\frac{1}{4} = \frac{1}{8} + \frac{1}{16}$, etc., and so on. The prepotencies or subpotencies of particular ancestors, in any given pedigree, are eliminated by a law that deals only with average contributions, and the varying prepotencies of sex in respect to different qualities are also presumably eliminated. Corrections for these can of course be made in any particular pedigree, taking care that the corrected series still amounts to 1 exactly."

Pearson has accepted the principle of the law of ancestral heredity, but has modified the mathematical proportions to correspond more nearly with actual statistical data: "In eye color in man and coat color in horses, the mean ancestral coefficients of regression form within the limits of error of random sampling a geometrical series, but it is not Mr. Galton's series:

.5000, .2500, .1250, .0625,
but more nearly .6244, .1988, .0630, .0202."

In other words, actual statistics show that in man and horses the parents are much more, and

the grandparents and higher ancestry less, influential than on Mr. Galton's hypothesis.

"Thus the law of ancestral heredity (by which we are to understand the theory of multiple correlation together with the hypothesis that the mean ancestral correlation or the regression coefficients form a geometrical series) fits the data for horse and man remarkably well." (Pearson, "Law of Ancestral Heredity," *Biometrika*, vol. ii, pp. 296, 297, Cambridge.)

3. Mendel's *Principles of Inheritance*: Mendel's principal paper was published in the *Verhandlungen des Naturforschenden in Brünn*, Abhandlungen IV, 1865, and remained entirely unnoticed, except for one or two passing remarks, for 35 years, when it was rediscovered by De Vries, Correns, and Tschermak, who confirmed Mendel's results in all essential respects. Mendel's results have since been confirmed and extended by numerous workers both for plants and animals, but much is still uncertain concerning both the extent to which the principles may be found to occur and also the fundamental physical basis on which they depend.

The two fundamental principles usually termed Mendelian are: (1) that of alternative inheritance, viz., that of two corresponding but contrasted pairs of characters of the parents, only one appears in the offspring. This is known as the dominant character; the character not appearing is the recessive character. (2) The law of segregation of characters, according to which both dominant and recessive characters reappear pure in 25% each of the offspring of hybrids.

To illustrate: the offspring of a gray and an albino mouse is gray; i.e., the gray character is dominant and the white recessive. But of the offspring of such hybrid gray mice, bred inter se, approximately 25% are white, the remainder being gray; furthermore, it is found that the whites continue to breed true indefinitely, but that of the 75% gray, only 25% continue to breed true to color and 50% split up, i.e., behave as hybrids, yielding 25% white and 75% gray. In other words, the offspring of gray-white hybrid mice are 25% white, 50% hybrid, and 25% gray; the hybrids, however, appear gray, owing to the dominance of gray over white. Expressed in general terms: D (the dominant character) \times R (the recessive character) = D(R) (the hybrid in which R is recessive). But the offspring of D(R)'s bred inter se are 25% D + 50% D(R) + 25% R. This result comes out clearly only when large numbers are compared; usually the larger the number compared, the closer the approximation to the theoretical formula.

These principles were found by Mendel to apply to the following corresponding characters of peas: (1) difference in form of the ripe seeds: round \times angular; (2) color of endosperm: yellow \times green; (3) color of seed coat: gray and gray brown \times white; (4) difference in the form of the ripe pod: inflated \times constricted between seeds; (5) color of unripe pods, the stalks, leaf veins, and calyx: green \times yellow; (6) position of the flower: axial \times terminal; (7) length of the stem: 6-7 feet \times $\frac{3}{4}$ -1 $\frac{1}{2}$ feet. In each the character named first was dominant in the hybrid, and the offspring of the hybrids were 25% D + 50% D(R) + 25% R.

The same laws have been found to apply to some other plants, to inheritance of color in mice, of various characters in guinea pigs and rabbits, of many characters in poultry, also in insects.

Mendel explained his results by assuming that the germ cells of the hybrids were not themselves hybrid, but consisted of equal numbers of two kinds with respect to any pair of corresponding characters, half bearing the dominant character and half the recessive character in a pure form. Thus, there are supposed to be in the hybrids, with respect to any pair of characters, equal numbers of ovules bearing the D and R characters, similarly of pollen grains. Hence it would follow that, assuming equal fertility between the two kinds of ovules and pollen, the chances of a D pollen grain uniting with a D ovule would be 25% of an R pollen grain uniting with an R ovule likewise 25%, but there would be 50% D(R)'s formed, which is the observed result. This doctrine, according to which the corresponding pure parental characters dissociate in the germ cells of the hybrid, is known as the doctrine of the purity of the germ cells, and is commonly expressed by saying that the germ cells of hybrids are pure with respect to corresponding parental characteristics. This law is really the essence of the Mendelian law of inheritance.

However, it should be noted that a single germ cell may bear some dominant and some recessive characters; it is rarely or never dominant or recessive in all characters. Furthermore, the two principles, viz., of dominance and segregation, are completely distinct and independent. It is at least theoretically possible that segregation may occur when inheritance is blending or particulate; some cases of this kind are actually known. Again, while the principle of segregation has been demonstrated repeatedly for the most diverse organisms and may be used in many cases to predict the probable characters of offspring of parents of known pedigree, the doctrine of the purity of the germ cells used to explain segregation is purely hypothetical and is indeed at least partially discredited by the phenomena of "latency." (Castle.) This is defined as "a condition of inactivity in which a normally dominant character may exist in a recessive individual or gamete." "Latency of pigment characters in albinos is particularly clear in mice, as shown by the investigations of Cuénot (1903), Darbishire (1904), and especially of Allen (1904). For albino mice are, so far as known, wholly unpigmented, yet they ordinarily, perhaps always, transmit latent pigment characters, either singly or in combinations identical with those occurring in pigmented mice." (Quoted from Castle, 1905.) Such "latent" pigment characters may appear in crosses between albinos and pigmented animals. Thus, the germ cells are certainly not pure with respect to the recessive characters in such cases, even though such albinos breed true inter se.

Physical Basis of Heredity. It is an axiomatic principle that no character is inherited in the sense in which property is inherited, by actual transmission. Inheritance, in the biological sense, is always by way of the germ and is due to the laws of development and growth. Heredity is due to development from similar germs, which have a common origin from a preëxisting germ. The starting point of the development of any individual (asexual and parthenogenetic development excepted) is a fertilized ovum which is a single cell produced by the union of the unfertilized ovum (maternal germ cell) and spermatozoön (paternal germ cell). The fertilized ovum multiplies by repeated division, producing a great number of descendants, most of which undergo differentiation to form the cells of the

various tissues of the body, or soma, but one or several remain undifferentiated and by subsequent division give rise to the numerous germ cells of the individual. These carry on the species by union with germ cells of the opposite sex, and the line of germ cells in the new generation is preserved in the same way as before.

Thus, in any line of descent the continuity is preserved through the germ cells, and heredity within the line is due to the continuity of the germ cells, which retain their original properties with great constancy. Continuity of germ cells is not a matter of conjecture, but of actual observation in several cases; while the extremely early origin of the germ cells in the embryos of most animals renders the theory that they are unmodified descendants of the ovum the most rational one. Heredity is therefore reduced to the laws of growth and development and is readily understood on the same principle that governs the resemblance between two plants growing from a common root.

It will be seen that the conception according to which heredity depends upon the continuity of the germ cells has far-reaching implications: 1. It implies a radical distinction between the somatic and germinal parts of each individual. The individual does not produce the germs wherewith he perpetuates the species, but the germs which his body contains are independent descendants of the fertilized ovum from which he himself arose. The body is a receptacle only for this imperishable part. 2. The descendants inherit from the germ; therefore the experiences of the particular somatic individual that transmitted the germ are of no significance for the future generation, except so far as they have modified the germ.

The theory of continuity of the germinal protoplasm was first clearly and definitely stated by Jaeger (*Zoologische Briefe*, p. 318, Vienna, 1876) and was subsequently elaborated by Weismann in his successive writings into a complicated theory of heredity and development. Darwin's provisional hypothesis of pangenesis is of great historical interest as the first consistent attempt in the modern period of biology to connect the complex phenomenon of heredity under some general point of view. The statement of the hypothesis in his own words is as follows: "I assume that the units" (i.e., the cells) "throw off minute granules which are dispersed throughout the whole system; that these, when supplied with proper nutriment, multiply by self-division and are ultimately developed into units like those from which they were originally derived. These granules may be called gemmules. They are collected from all parts of the system to constitute the sexual elements, and their development in the next generation forms a new being; but they are likewise capable of transmission in a dormant state to future generations and may then be developed. Their development depends on their union with other partially developed or nascent cells which precede them in the regular course of growth. . . . Gemmules are supposed to be thrown off by every unit, not only during adult state, but during each stage of development of every organism; but not necessarily during the continued existence of the same unit. Lastly, I assume that the gemmules in their dormant state have a mutual affinity for each other, leading to their aggregation into buds or into the sexual elements. Hence it is not the reproductive organs or buds which generate new organ-

isms, but the units of which each individual is composed. These assumptions constitute the provisional hypothesis which I have called Pangenesis. Views in many respects similar have been propounded by various authors." (Darwin, *Animals and Plants under Domestication*, vol. ii, p. 370, New York, 1900.)

Inheritance of Acquired Characters. This has been a much discussed phase of the problems of heredity, and the question, May acquired characters be inherited? may be said to have been provisionally decided in the negative, because, in the first place, there is no instance on record of the inheritance of any single acquired somatic character, and, in the second, no theory can be suggested, consistent with our knowledge of development, that can explain the mechanism of such transmission. It is necessary, however, to justify these statements by a brief definition of the problem. In the first place, we may define an acquired character as a somatic modification that may be produced by use or disuse, disease or accident, or action of the environment. Now every acquired character presupposes a disposition towards such acquisition inherited from the germ; in other words, every acquired character has a germinal basis, which is of course inherited. The question of the inheritance of acquired characters, therefore, resolves itself into this: May any modification of a somatic part produced by use or disuse, action of the environment, disease or accident, produce such modification in the germ as to alter the germinal disposition in the same direction? It would require the demonstration of some such phenomenon to establish the inheritance of an acquired character as such. No such evidence has been offered hitherto.

An apparent effect of environment in heredity may be explained in two ways: 1. High development of any somatic character implies an unusual germinal disposition, and if the acquired character serves to insure the propagation of the individual possessing it, the unusual germinal disposition will be transmitted. Thus, acquired characters may serve to foster unusual germinal aptitudes by insuring their propagation. 2. The germ cells are themselves directly accessible to stimuli and may be directly modified thereby. Thus, in most animals and plants temperature, humidity, or composition of the internal circulating medium may act directly upon the germ cells and cause modification in them. (See Tower, 1907; McDougal, 1906.) Examples of the second kind have been cited as demonstrating the inheritance of acquired characters, but such cases are of course radically different in principle from the definition above.

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HEREFORD, hēr'e-ford. The capital of Herefordshire, England, a parliamentary and municipal borough of great antiquity, and an episcopal see, on the Wye, 144 miles west-northwest of London (Map: England, D 4). The chief building is the cathedral, dating from 1079 and the fourth church built on the site; it was restored in 1856-63. The chapter house contains the famous *Mappa Mundi* (Map of the World) of the thirteenth century. Other edifices are the Bishop's Palace, containing a fine Norman hall; the Coningsby Hospital (1614), an asylum for old soldiers and servants; the corn exchange, the shire hall, and a new town hall (built in 1904). Hereford has an endowed grammar school of the fourteenth century. It owns profitable markets and real estate, gas, water, and electric-lighting plant; maintains a fire brigade, free library and museum, and the Castle green. Its industries and trade are chiefly agricultural. The see of Hereford was created in 673; the town was a fortified place in the reign of Athelstan, and numerous charters begin with King John. For its loyalty and sufferings during the Civil War, Charles I bestowed the motto "Invicta fidelitatis præmium." Hereford was the birthplace of Nell Gwynne and David Garrick. Pop., 1901, 21,400; 1911, 22,568. Consult Duncumb, *History and Antiquities of Hereford* (Hereford, 1804; new ed., London, 1882), and Fisher, *Hereford Cathedral* (ib., 1898).

HEREFORD CATTLE. See CATTLE.

HEREFORDSHIRE. An inland county in the west of England, bounded on the west by South Wales and on the east by the counties of Worcester and Gloucester (Map: England, D 4). The surface of the county is hilly, with occasional valleys. Among the chief hill ranges are the Black Mountains on the west and the Malvern Hills on the east border. The Wye and its affluents, with the Lugg, the Arrow, and the Teme, are the principal rivers. Herefordshire is essentially an agricultural county, with four-fifths of its area of 842 square miles under cultivation. Camden said of it that "for wheat, wool, and water it yieldeth to no shire in England." It is also famous for its perry and cider. Pop., 1901, 114,125; 1911, 114,269. Capital, Hereford.

Herefordshire formed a portion of the territory of the ancient Silures and was conquered by the Romans about 73 A.D. During the heptarchy it was included in Mercia. From its position on the Welsh border—a portion of the county being included in the debatable land called the "Marches"—Herefordshire was long the scene of frequent contests. Consult *Victoria History of the County of Hereford* (London, 1908).

HEREMANS, hēr'e-māns, JACOB FRANS JAN (1825-84). A Dutch philologist, born at Antwerp. He studied at the Antwerp Athenæum

and in 1843 was appointed assistant librarian of the city. In 1864 he was appointed professor of the Dutch language and literature at the University of Ghent. He was a specialist also in Flemish literature and wrote biographies of the Flemish poets Ledeganck (1847) and Van Rijs-wijk (1850) and of the historian David (1868). His other books include: *Nederlandsche dicht-er-halle* (2 vols., 1858-64); *Hoffmann van Fallers-leben en de nederlandsche letterkunde* (1874); *Over den invloed van Noord-Nederland op de let-terkunde in de zuidelijke provinciën gedurende het tijdperk 1815-30* (1874)—all on literary topics; and *Nederlandsche spraakleer* (1846); *Nederlandsche metrick* (1862); and his Dutch-French dictionary (1865-69). He founded the *Nederlandsch Museum*, a Flemish review, in 1874.

HERENNIUS. See CORNIFICIUS.

HERENNIUS SENE/CIO. A Roman orator, upholder of the Republican ideals. He is often mentioned in the letters of Pliny the Younger, with whom he was associated in the prosecution and condemnation of Bæbius Massa in 93 A.D. See HELVIDIUS PRISCUS.

HERERO, hā-rā'rō. A tribe speaking a Bantu language and occupying a portion of German Southwest Africa. They were greatly reduced in the insurrection of 1903-04, possibly to one-half or even one-third of their original number. In 1908 those seeking shelter in government and missionary stations were estimated at 16,000.

The Herero differ from all other Bantu-speaking tribes in their ignorance of agriculture when discovered by the whites. They are essentially a pastoral people; and this fact, together with a supposedly nonnegroid cast of features, had led Passarge to suggest that they are of Hamitic origin. At all events, it must be conceded that their own traditions indicate a relatively recent immigration into the southwest, and there is evidence of relationship with the tribes to the east, in the vicinity of Lake Tanganyika.

For food the Herero depend on the milk, not meat, supplied by their stock, and to a lesser extent on the products of the chase. The aboriginal dress is of skin; the women are distinguished by a unique headgear—a leather helmet decorated with strings of beads or shells, from the back of which there rise three peaks shaped like asses' ears. Their huts are beehive-shaped and are covered with hides during the rainy season. Assegai spears and knobkerries serve as weapons.

Sociologically the Herero are of special interest mainly as following at the same time both maternal and paternal descent: they are divided into about 10 clans of doubtful function with matrilineal descent, while affiliation with one of the 15 religious organizations depends on the father's membership. These religious bodies have distinctive taboos, largely of a dietary character. The kinship terminology is of the classificatory type. The custom of cross-cousin marriages—i.e., unions between children of a brother and a sister, but never of two brothers or two sisters—is generally practiced.

Among the religious usages the maintenance of a sacred fire by the chief's daughter was a distinctive peculiarity. Extinction of the fire was believed to augur tribal extermination. Consult Hanz Schinz, *Deutsch Südwest-Afrika* (Oldenburg and Leipzig, 1891), and S. Passarge, *Südafrika* (ib., 1908).

HEREROLAND, hā-rā'rō-lānt, or DAMARA-LAND. A northern part of German Southwest Africa (q.v.), inhabited by the Herero (q.v.) or Ovaherero tribe.

HERESY (OF. *heresie*, Fr. *hérésie*, from Lat. *hæresis*, school of thought, from Gk. *αἵρεσις*, *hairesis*, choice, from *αίειν*, *hairein*, to take). The name given to religious opinion held within the Church and declared by ecclesiastical authority to be erroneous and contrary to the accepted standards of the Church. In the Septuagint the word is used without sinister meaning of the various Jewish parties—Pharisees, Sadducees, and Essenes—and similarly in the Acts of the Apostles. Paul employs it to denote the party divisions into which the Corinthian Christians have fallen, and he rebukes them because they destroy the unity of Christ's flock. Once only in the New Testament (2 Peter ii. 1) has the word its later meaning of *wrong belief*. For some time the boundary line between right and wrong doctrine, orthodoxy and heresy, was not perfectly clear; but a distinction was soon rendered possible by the growth of ancient Catholic Christianity. Before the close of the second century the bishops had begun to test doctrinal soundness by the Rule of Faith (q.v.) and the Canon of Scripture as standards, the interpretation of which was held to rest with themselves. Thus judged, the Gnostics (q.v.) are heretics to Irenæus (180) and Tertullian (c.200), both of whom wrote treatises against heretics.

Beginning with Nicæa (325), the ecumenical councils gave united expression to the doctrinal belief of Christendom, so that the determination of what constituted heresy became much easier than before. With the adoption of Christianity as the state religion under Constantine, the civil government was led to take cognizance of heresy, on the ground that it imperiled the public welfare. The first Imperial edicts to be mentioned in this connection are those of Constantine against the Donatists (q.v.) in 316. Under succeeding emperors similar decrees become frequent and increasingly severe. Especially important are the edicts of Theodosius the Great, who set about enforcing orthodoxy throughout his whole Empire and made heresy a capital crime in 382. St. Augustine lent his support to a policy of coercion and sought to rest it upon the authority of Christ, who said: "Compel them to come in" (Luke xiv. 23). The first Christian to suffer death for his belief, at the hands of fellow Christians, was the Spaniard Priscillian (q.v.), who was charged with holding doctrines akin to those of Manichæism (q.v.). Priscillian was executed at Treves, in 385, by order of the usurping Emperor Maximus. In the sixth century Justinian, the great codifier of Roman law, collected the Imperial edicts against heresy in the first book of his celebrated *Code*. The spirit which had already taken possession of the Christian Church is well illustrated by the saying of Pope Gelasius I (492-496): "Toleration of heretics is more injurious than the worst devastation of the provinces by the barbarians."

Antiheretical laws were more fully developed from the eleventh century onward, when the various sects of the Cathari (q.v.) began to infest southern Europe. It was in connection with the Albigensian Crusade (see ALBIGENSES), in the thirteenth century, that the Dominican courts of inquisition were established. (See INQUISITION.) During this period the close alliance between Empire and Papacy made it possible for each to

aid the other in detecting and punishing offenders. The penalties for heresy included loss of civil rights, banishment, and confiscation of property. In addition, the Church could inflict punishments of her own, such as excommunication. A clergyman, if convicted, could be deposed and degraded from office. Like treason, heresy was construed as a capital offense. But it was an established Catholic axiom that "the Church does not thirst for blood." According to medieval usage, therefore, a heretic, declared guilty by the ecclesiastical courts, was handed over to "the secular arm" for execution. The earliest recorded instance of the legal use of burning, as a form of inflicting the death penalty, occurs in Lombardy in 1224. The English law, *de hæretico comburendo*, was enacted in 1401, in which year the first burning in England took place. The last execution by this means in England was in 1612.

According to the canon law, "formal heresy" (*hæresis formalis externa*) exists, in the case of a baptized Christian, when he consciously adopts and persistently maintains an opinion known to be contrary to the doctrinal standards of the Church. What is called "material heresy" consists in falling into heretical opinion through ignorance, and this is an offense of far less gravity. Previous to the Protestant Reformation the Church was in a better position to carry out a systematic policy of repression than it has been since. In most modern governments church and state are so far separated that the state takes no cognizance of heresy. It remains solely a matter of ecclesiastical discipline. See DISCIPLINE, ECCLESIASTICAL.

Different churches differ widely in the extent to which they attempt to control the belief of their adherents. The most effectual system is that of the Roman Catholic church, which in its modern form goes back to the establishment of the Congregation of the Holy Office in 1542. For many years (from Urban V in 1364 to Clement XIV in 1769) the papal bull, *In Cœna Domini*, which enumerated the heresies condemned by the Church, was publicly read in Rome on Maundy Thursday. More recently the Pope has sometimes felt compelled to warn the faithful against prevalent error, which, if adopted and persisted in, might become open heresy. Thus, Pope Pius IX published his celebrated *Syllabus of Errors* in 1864, condemning 80 current opinions as erroneous; and Pius X, the encyclical *Pascendi*, in 1907, against the positions of the Modernists.

Some of the Protestant reformers held almost as stringent views respecting the repression of heresy as did their Catholic contemporaries. Calvin approved the execution of Servetus (q.v.), and Beza and Melancthon defended it. But most Protestants have gradually tended to rest satisfied with securing, by means of adequate tests, a reasonable degree of theological uniformity among the clergy, trusting the laity to conform their belief to that of their spiritual leaders. Heresy trials have occurred in several denominations in recent times, but their outcome does not encourage the hope that doctrinal agreement can be promoted by such means. The Protestant churches of to-day show an increasing aversion to the thought of trying men for their beliefs, and a desire to emphasize their fundamental principle of the right of private judgment, which was asserted at the Reformation. With the denial of ecclesiastical authority over

belief, heresy, in its traditional meaning, has become a word without present significance in the Protestant world.

Bibliography. Burton, *Heresies of the Apostolic Age* (London, 1829), which contains a bibliography; Hahn, *Geschichte der Ketzer im Mittelalter* (Stuttgart, 1846-50); for a history of the heresies down to the Protestant Reformation, Harnack, *History of Dogma* (Boston, 1894-1900); Lea, *History of the Inquisition in the Middle Ages* (New York, 1906). For the Catholic view, De Cauzons, *Histoire de l'inquisition en France* (Paris, 1909); Van Espen, *Jus Ecclesiasticum* (Cologne, 1702), especially on the legal aspects of heresy; Hinschius, *Kirchenrecht der Katholiken und Protestanten* (Berlin, 1869-97); White, *History of the Warfare of Science with Theology* (New York, 1896). See HERETIC.

HERETIC. A person within the Church holding an erroneous religious belief or one contrary to the standards of the Church. (See HERESY.) The most important of the individuals and sects commonly classed as heretical may be thus enumerated. The early orthodox writers represent Simón Magus (Acts viii) as the father of heresies. After him, in the first two Christian centuries, come Menander, Cerinthus, the Ebionites, Nicolaitans, Nazarenes, and Elkesaites (Judaizing parties). In the second century, the Gnostics, Saturnilus, Basilides, Valentinus, Ptolemaeus, Marcus, and Heracleon; the antinomian sects of Ophites, Cainites, and Sethians, with whom we may class Carpocrates; the representatives of the ascetic tendency, Tatian and the Encratites; Marcion, and his followers, the Marcionites; Montanus and the Montanists; the Alogi, of Asia Minor (who rejected the Logos idea and the fourth Gospel); and among the earlier Monarchians, Theodotus of Byzantium, Theodotus the money changer, Artemon, Praxeas, and Noëtus of Smyrna. In the third century, Sabellius, Paul of Samosata, Mani (from whom come the Manichæans), Novatian and his adherents. In the fourth century, the Arians (who opposed the Athanasian doctrine of the Trinity), the (schismatic) Donatists, who run over into the fifth century, the Macedonians, and the Apollinarians. In the fifth century, in the East, the Nestorians, Eutychians, Monophysites, and Origenists (all of whom were heterodox in Christology); in the West, the Pelagians and Semi-Pelagians, all of whom were combated by St. Augustine. The Semi-Pelagians run over into the sixth century. In the seventh century, the Monothelites (logical successors to the Monophysites). In the eighth, the Paulicians of Armenia, descended from an ancient adoptionist type of Christianity, whose origin is perhaps to be sought in the teaching of Paul of Samosata. In the eleventh century we find the Euchites, inaccurately described as Manichæans. In the twelfth, the Bogomiles, Petrobrusians, Cathari, and Waldenses (the last two having a considerable period of activity). In the thirteenth century, the important and numerous Albigenses. In the fourteenth, the Friends of God and the Brethren of the Free Spirit, and (in England) Wiclif and the Lollards. In the fifteenth, Huss and the Hussites, Taborites, Calixtines, Jerome of Prague, and the Bohemian Brethren. Savonarola (q.v.) was condemned as a heretic. In the sixteenth century came the Protestant movement. The reformers were technically heretics so long as they remained in the Church, for they upheld views contrary to the currently accepted

interpretation of the standards of the Church. When they went out and organized churches of their own, they became schismatics. Their own members who denied their standards became in turn heretics, like the early Unitarians within the Congregational churches in New England, with whom Trinitarian Congregationalists refused to fellowship. The heretic has been so often the prophet of the future that a certain glory has gathered about the word; but it does not necessarily follow because a man differs from the past that the future will agree with him.

The great change in the ecclesiastical situation wrought in the sixteenth century, and the speedy legalizing of new church organizations, has made the whole problem of heresy a different one since that time. See the various titles mentioned in this article; and, for bibliography, see HERESY.

HERETIC BAPTISM. One of the great questions in the Christian Church of the third century relating to the reception into the Church of those who had been baptized by heretics. Up to that time it would seem that the baptism of such persons had been accepted, and the rite had not been repeated. Clement of Alexandria (died c.215), it is true, in passing calls "heretic baptism not proper and true water," but he does not say that it was invalid, and the universal practice was to consider it valid. But in the early part of the third century Agrippinus, Bishop of Carthage, took opposite ground, influenced perhaps by Tertullian, who says: "Heretics have no fellowship in our discipline. . . . Therefore their baptism is not one with ours . . . a baptism which, since they have it not duly, doubtless they have not at all." This Agrippinus presided over a synod held in Carthage between 218 and 222 which pronounced heretic baptism invalid, and the same declaration was made by two Asia Minor synods held about this time. It then became the practice in Carthage and elsewhere to rebaptize those received into the Church from the heretical sects, on the ground that the baptism which they had received was no baptism.

But the Roman church, and apparently the majority of the churches in the West, dissented from Agrippinus, considering that the use by heretics of the baptismal formula made their baptism valid. In so acting these churches followed precedent, and instituted the practice since followed by the Roman Catholic church throughout the world.

When Cyprian, the great Bishop of Carthage, came into his see (in the year 248-249) he accepted the view of the Carthaginian church, and when it was criticized he called synods, in 255 and 256, which confirmed the practice of rebaptism of converts from the heretics. Pope Stephen refused to confirm the decision of the African synods and wrote back severely reprimanding their action.

The position of Stephen found vigorous supporters and probably little opposition in the Western church generally. Thus, Augustine, Bishop of Hippo (died 430), the final teacher of the Western church, lays down the same doctrine in writing against Petilian the Donatist: "When the water of baptism is given to any one in the name of the Father, and of the Son, and of the Holy Spirit, it is neither ours nor yours, but His of whom it was said to John, 'Upon whom thou shalt see the Spirit descending, and remaining on Him, the same is He who baptizeth with the Holy Spirit.'"

But Cyprian's view was accepted and defended in many places, and universally by the Donatists, against whom Augustine wrote *De Baptismo contra Donatistas*.

The Eastern church has followed Cyprian rather than Stephen in denying validity to heretical baptism and insisting upon an orthodox interpretation of the baptismal formula. That this was early the case is shown by the remark of Cyril, Bishop of Jerusalem (died 386): "We may not receive baptism twice or thrice . . . for there is only one baptism . . . heretics, however, are rebaptized since the first [so called] baptism was no baptism"; by the council in the *Apostolic Constitutions*, of uncertain date, but probably prior to the sixth century, which affirms the same doctrine; and yet more strongly by the command in the *Apostolic Canons*, dating from the same period: "If a bishop or presbyter . . . does not baptize him who is polluted by the ungodly [i.e., has received heretical baptism], let him be deprived." Athanasius (died 373) and the Council of Nicæa (325) take the same view; but the Council of Laodicea (somewhere between 343 and 381) distinguishes between heretics upon the ground of their position respecting the Trinity, enjoining rebaptism upon those who came into the Catholic church from the Montanists (canon 8), but not upon those from the Novatians or Quartodecimans (canon 7).

Thus the West universally accepted the teaching of Stephen, that where baptism was administered in the name of the Trinity it is valid; while the East qualified it by insisting that the person baptizing must be orthodox as to the Trinity, otherwise the baptism was invalid. The present teaching of Roman Catholics and Protestants is that of Pope Stephen; while in the *Orthodox Confession of the Greek Church* direct mention is made of the necessity of an orthodox interpretation of the formula, and the same is implied in the *Longer Catechism of the Eastern Church*. If the validity of the baptism is in doubt, a conditional baptism may be administered; and this is usually done in the case of converts to the Catholic church in the United States. See DONATISTS; NOVATIANS.

HEREWARD, hēr'e-wôrd. An English outlaw who has passed into legend as the last champion of Saxon England against the Normans. He was a native of Lincolnshire and appears in Domesday as the owner of lands in a number of places in that shire. In 1070 Hereward headed a revolt among the inhabitants of Peterborough and with the aid of a Danish fleet burned the town and plundered the abbey. He then retreated to the Isle of Ely, among the fens, where for more than a year he held out against the Normans. Here he was joined by a number of Saxon leaders, among them Morkere the former Earl of Mercia. He was finally driven from his refuge by William the Conqueror. Hereward's subsequent career is unknown, but it would seem that he made his peace with the King, who employed him in his wars in Normandy. The surname of Wake or Watchful dates from a much later period. Charles Kingsley has depicted Hereward as "the last of the English" in his novel *Hereward the Wake*. Consult: Freeman, *History of the Norman Conquest*, vol. iv (Oxford, 1876); Round, *Feudal England* (London, 1895); Davis, *England under the Normans and Angevins* (New York, 1905).

HERFORD, hēr'fôrt. The capital of a district in the Province of Westphalia, Prussia, sit-

uated at the junction of the Aa and the Werre, 10 miles from Bielefeld (Map: Prussia, C 2). It is a town of great antiquity and contains an old twelfth-century Münsterkirche, a thirteenth-century church, a Gymnasium founded in 1540, and a theatre. It has also an agricultural and trade school and a teachers' institute. The chief manufactures of the town are linen, cotton goods, agricultural machinery, sewing machines, furniture, clothing, chocolate, and confectionery, cigars, tobacco, and carpets. The trade is important. Herford is supposed to owe its origin to the convent founded in 822, whose abbess enjoyed a princely rank. The convent was abolished in 1803. Pop., 1900, 25,109; 1910, 32,546, mostly Protestants.

HERFORD, hēr'ford, BEATRICE (?-). An American monologist, sister of Oliver Herford. She was born in Manchester, England, spent her early years in the United States, and was again in England from 1893 to 1897. In the latter year she married Sidney Willard Hayward, of Wayland, Mass., where she afterward resided. Her début as a monologist was made in London. The best known of her very clever monologues (written as well as presented by her) are "The Shop Girl" and "A Sociable Seamstress." A volume of these sketches, entitled *Monologues*, was published in 1908.

HERFORD, hēr'ford or hār'ford, CHARLES HAROLD (1853-). An English scholar, born at Manchester and educated at Cambridge and in Germany. He was appointed professor of English language and literature at University College, Aberystwyth, Wales, in 1887; lectured at Oxford in 1897, at Baltimore and Chicago in 1900; and in 1906 was professor of English literature at the University of Manchester. In 1885 he founded the English Goethe Society. Pains-taking scholarship appears in his contributions to the *Dictionary of National Biography*, in his *Studies in the Literary Relations of England and Germany in the Sixteenth Century* (1886), *Age of Wordsworth* (1897), and his *Robert Browning* (1904). He translated Ibsen's *Brand* in the original metres (1893) and *Love's Comedy* (1900). He also edited the "Eversley" Shakespeare in 1902. In 1911 appeared his *Memoir of W. H. Herford*.

HERFORD, HEINRICH VON. See HEINRICH VON HERFORD.

HERFORD, hēr'ford, OLIVER (1863-). An American artist and writer, brother of Beatrice Herford. He was educated at Lancaster College, England, and at Antioch (Ohio) College, and studied art at the Slade School, London, and at the Académie Julian, Paris. His work as an illustrator has a drollery of an original flavor, and his humor of the pencil happily and fittingly supplements the individual and eccentric comicality and whimsicality of his writings in prose and verse. The following include representative examples of the work done by him in his two fields of activity: *The Bashful Earthquake and Other Fables and Verses* (1898); *Alphabet of Celebrities* (1899); *A Child's Primer of Natural History* (1899); *Overheard in a Garden* (1900); *Rubaiyat of a Persian Kitten* (1904); *Cupid's Almanach* (1908); *Simple Geography* (1909); *Happy Days* (1911); *The Mythological Zoo* (1912); *The Jingle-Jungle Book* (1913); *Capers: His Haps and Mishaps* (1914).

HERGENRÖTHER, hēr'gen-rē'tēr, JOSEPH (1824-90). A Catholic theologian of Bavaria.

He was born at Würzburg and studied theology there and in Rome. He became a priest in 1848, instructor at Munich in 1850, and in 1852 professor of Church law and history at Würzburg. In 1868 Pius IX made him a member of the canonical commission for the Vatican Council. He is best known for his *Anti-Janus* (1870), an answer to Döllinger's *Janus*, and the *Kritik der von Döllingerschen Erklärung vom 28. März 1871* (1871). In 1879 he was made Cardinal. He was specially interested in the separation of the Greek and Roman churches. Among his historical works are: *Der Kirchenstaat seit der französischen Revolution* (1860); *Photius Patriarch von Constantinopel* (3 vols., 1867-69); *Katholische Kirche und Christlicher Staat in ihrer geschichtlichen Entwicklung und in Beziehung auf die Fragen der Gegenwart* (1872-76); *Handbuch der allgemeinen Kirchengeschichte* (last ed., 1884-86); *Kardinal Maury* (1878); *Abriss der Papstgeschichte* (1879); *Leonis X, Pontificis Maximi, Regesta* (1884-91); and two volumes of continuation of Hefele's *History of the Council* (1887-90). Consult Steiner, "Kardinal Hergenröther," in *Episkopat der Gegenwart* (Würzburg, 1876), and Stamminger, *Zum Gedächtnisse Kardinal Hergenröthers* (Freiburg, 1892).

HER HOR, hēr hör, or SMENDES. An Egyptian king, of the twelfth century B.C., founder of the twenty-first dynasty, originally chief priest of Ammon. He built much at Karnak, and it was he who stored away the royal mummies discovered by Brugsch Bey in 1881.

HÉRICART-FERRAND, ā'rē'kār'-fā'rān', LOUIS ETIENNE FRANÇOIS, VICOMTE DE THURY (1776-1854). A French engineer and agriculturist, born in Paris and educated there, at the School of Mines. From 1809 to 1830 he was inspector general of quarries and for the last seven years of this period was director of works. He was a deputy in 1815-27 and in 1824 was elected to the Academy of Sciences. He contributed to the *Journal des Mines* (1799-1815), to the *Annales des Mines*, and to the *Annales de la Société d'Horticulture*; and wrote *Descriptions des catacombes de Paris* (1815), *Considérations sur les puits forés* (2d ed., 1829), and *Du dessèchement des terres cultivables* (1831).

HÉRICAUT, ā'rē'kō (DE RICAULT), CHARLES JOSEPH (1823-99). A French historian and romancer, born at Boulogne-sur-Mer. He began his literary career by writing for the *Revue des Deux Mondes* and other journals, and for seven years (1883-90) he conducted one he had himself founded, the *Revue de la Révolution*. His novels include: *La fille aux bleuets* (1860); *Un gentilhomme catholique* (1863); *La reine sauvage* (1869); *Les cousins de Normandie* (1874); *Le premier amour de lord Saint-Albans* (1879); *Le dernier amour de lord Saint-Albans* (1879); *Aventures de deux Parisiennes pendant la Terreur* (1881); *Une reine de théâtre* (1881); while the best of historical work is to be found in *Origine de l'épopée française et son histoire au moyen âge* (1860); *La France guerrière* (1867); *Histoire nationale des naufrages et aventures de mer* (1870); *Thermidor, Paris en 1794* (1872); *La Révolution, 1789-1882* (1882); *Histoire anecdotique de la France* (1887-90). He edited the works of Gringoire, Clément Marot, and Charles d'Orléans.

HERING, hēr'ing, CARL (1860-). An American electrical engineer, born in Philadel-

phia. He graduated in 1880 (M. E., 1887) from the University of Pennsylvania, where he was an instructor for several years, and studied also at Darmstadt, Germany. Engaged in the practice of electrical engineering at Frankfort, Germany, and in Philadelphia, he made a specialty of electric furnaces and electrolytic corrosion. He served as delegate and juror of awards at nine expositions, in 1901 was decorated with the Legion of Honor of France, and was elected president of the American Institute of Electrical Engineers in 1900 and of the American Electrochemical Society in 1906. The University of Pennsylvania conferred on him an honorary D.Sc. in 1912. He compiled a *Digest of Electrical Literature* and is author of *Principles of Dynamo-Electric Machines* (1888; 5th ed., 1890); *Universal Wiring Computer* (1891); *Ready Reference Tables* (1904).

HERING, hā'ring, CONSTANTIN (1800-80). A German-American physician. He was born in Oschatz, Saxony; studied medicine and surgery at Leipzig, Würzburg, and Dresden, and soon afterward became a convert to homœopathy. In 1833 he emigrated to America and settled in Philadelphia, where he founded the first American homœopathic school, and from 1845 to 1860 was professor of the institutes of medicine and materia medica in that institution. His works include: *Rise and Progress of Homœopathy* (1834); *Effects of Snake Poison* (1837); *Guiding Symptoms and Analytical Therapeutics* (1875).

HERING, DANIEL WEBSTER (1850-). An American physicist and university dean. He was born in Washington Co., Md., graduated Ph.B. in 1872 and C.E. in 1878 from the Sheffield Scientific School (Yale), and was fellow in engineering at Johns Hopkins University in 1876-78. He was professor of mathematics at Western Maryland College in 1880-84, professor of physics at the Western University of Pennsylvania (now University of Pittsburgh) in 1884-85, and professor of physics and applied mechanics after 1885 and dean after 1902 at New York University. Besides his scientific monographs on church acoustics, compressed air, and X-rays, he is author of *Essentials of Physics for College Students* (1912).

HERING, hā'ring, EWALD (1834-). A German physiologist and psychologist. He was born at Alt-Gersdorf in Saxony on Aug. 5, 1834, practiced medicine in Leipzig in 1860, and became docent in physiology at the university there in 1862. Three years later he was appointed professor of physiology at the medicosurgical Josephs-Akademie, Vienna. From 1870 to 1895 he occupied a similar position at the German University at Prague, and in 1895 he was called to Leipzig. His chief works are: *Beiträge zur Physiologie* (1861); *Die Lehre vom binocularen Sehen* (1868); *Ueber das Gedächtnis als eine allgemeine Funktion der organisierten Materie* (1870; Eng. trans., *On Memory as a General Function of Organized Matter*, 1897; 4th ed., enlarged, 1913); *Grundzüge einer Theorie des Temperatursinnes* (1877); *Zur Lehre vom Lichtsinne* (1878); "Raumsinn des Auges—Augenbewegungen" (1879), "Temperatursinn" (1880)—both in Hermann, *Handbuch der Physiologie*; *Ueber Newtons Gesetz der Farbmischung* (1887); *Zur Theorie der Nerventätigkeit* (1899); *Grundzüge der Lehre vom Lichtsinn* (1905-11). He also wrote many articles upon topics connected with visual theory.

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Hering won a high place among psychologists by his contributions to psychophysics. His name is especially associated with four features of this science, by (1) his investigations into visual space perception, wherein he argued for the nativistic or physiological theory against the "empiristic" position of Helmholtz; (2) his treatise on memory as a general function of organized matter; (3) his criticism of Fechner's interpretation of "Weber's law"; and (4) his theory of color vision, which stands out in sharp rivalry with that of Helmholtz. Nearly all subsequent theories may be regarded as improvements upon, or modifications of, these two theories. Hering's cardinal postulates are: (1) an independent light process (grays); (2) a paired arrangement of the constituent processes (white black, red green, yellow blue); and (3) an antagonistic relation between the colors of each pair. The advantages of this theory as an explanation of the psychological phenomena of vision have won for Hering, in principle, the support of the great majority of psychologists.

HERING, RUDOLPH (1847-). An American engineer, born in Philadelphia. He graduated at the Polytechnic School in Dresden, Germany, and from 1868 on was employed in important hydraulic and sanitary engineering work for cities throughout the United States and Canada. In 1881 he prepared, for the National Board of Health, a comprehensive report on the sewerage of European cities. As consulting engineer, he published also special reports on water supply and purification, sewerage and sewage treatment, the collection and disposal of garbage and other city refuse. In 1913-14 he was president of the American Public Health Association.

HERINGSDORF, hā'ring-sdōrf. The principal German summer resort on the Baltic coast, situated on the island of Usedom in the Prussian Province of Pomerania, 40 miles from Stettin. On the land side it is surrounded by a fine beech forest, has numerous fine villas and hotels, and is visited by about 15,000 people annually. Pop., 874.

HERINGTON, hēr'ing-ton. A city in Dickinson Co., Kans., 81 miles southwest of Topeka, on the Chicago, Rock Island, and Pacific, and the Missouri Pacific railroads (Map: Kansas, E 5). It is in a farming district and has railroad shops and a Carnegie library. The water works and electric-light plant are owned by the city. Pop., 1900, 1607; 1910, 3273.

HERIOT, hēr'ot (AS. *heregeatu*, military apparel, from *here*, Goth. *harjis*, OHG. *heri*, Ger. *Heer*, OChurch Slav. *kara*, OPruss. *karijs*, OPers. *kāra*, army + *geatu*, equipment). In old English law, a customary tribute of goods and chattels, payable to the lord of the fee on the death of a freehold tenant. It may have had its origin in the practice of returning to the lord the martial equipment which he had furnished to his vassal. But in course of time it came to be regarded as a form of relief (q.v.), payable by the heir on succeeding to the inheritance, as a sort of inheritance tax or death duty. If a vassal fell in battle in the service of his lord, no heriot was demanded. As heriots were due only of tenants who held by knight's service, they disappeared with the abolition of military tenures. Nominally, however, the right still exists in England in connection with copyhold estates, but it is in practice obsolete. See TRIBUTE.

HERIOT, hēr'ot, GEORGE (1563-1624). A Scottish goldsmith and philanthropist, founder

of Heriot's Hospital, Edinburgh. He was the son of a goldsmith of Edinburgh and followed his father's business. In 1597 he was appointed goldsmith to Anne of Denmark, consort of James VI of Scotland, and four years afterward to the King, on whose accession, in 1603, to the English throne, Heriot went to London, where as court jeweler and banker he amassed a large fortune. Of this he left £23,625 to the town council of Edinburgh for the education of the children of decayed burgesses and freemen of that city. According to his will, the hospital or school which he wished to found was to be in imitation of Christ's Hospital, London. The school was opened in 1659; in 1885 it was reorganized for secondary and higher branches. In 1902 the funds yielded upward of £50,000 and, besides supporting the original foundation, furnished many scholarships at the Heriot-Watt College, the university, and other schools of Edinburgh. Heriot figures as "Jingling Geordie" in Scott's *Fortunes of Nigel* (Edinburgh, 1822). Consult William Steven, *History of George Heriot's Hospital with a Memoir of the Founder* (3d ed., Edinburgh, 1872), and Oliver and Boyd, *Edinburgh Almanack* (ib., 1888).

HERIOT, GEORGE (1766-1844). A Canadian soldier and author, born on the Isle of Jersey. In 1799 he was at Quebec in the Ordnance Department. The following year he was appointed Deputy Postmaster-General and held the position for six years. He became a soldier during the War of 1812, was next in command to De Salaberry at the battle of Chateauguay, and in 1841 was promoted a major general of militia. He represented Drummond County (1830-34) in the Lower Canada Legislature and wrote a *History of Canada* (2 vols., 1804), wherein he is largely indebted to Charlevoix, and also *Travels through the Canadas* (1807).

HERIOT, JOHN (1760-1833). A Scottish author, born at Haddington. He was educated at Edinburgh High School and University, but left without graduating on account of lack of means, and went to London. Here he entered the marine service, was made a lieutenant at the age of 18, was in several of the naval engagements of the period, and was wounded in Rodney's fight with the French under De Guichen (April 17, 1780). When the war was over, Heriot was retired upon half pay, which he supplemented by making light literature out of his heavy experiences, such as *The Sorrows of the Heart* (1787) and *The Half-Pay Officer* (1789); but more important is his *Account of Gibraltar* (1792). After starting and editing two newspapers, he retired into government positions, and from 1810 to 1816 lived in Barbados as deputy paymaster-general of the troops in the Windward and Leeward Islands. The last 17 years of his life he spent in Chelsea Hospital, where he was comptroller.

HERI-RUD, hēr'ē-rōōd' (Lat. *Arius*). A river of Central Asia, rising in the Koh-i-Baba Range of the Hindu Kush Mountains, 150 miles west of Kabul (Map: Afghanistan, L and M 5). It flows through Afghanistan, for more than 300 miles through a fertile and beautiful valley past Herat; then, bending suddenly to the north, it flows along the Persian boundary, and afterward northwest through Turkestan, making a farther course of 400 miles, till it terminates in the swamp of Tejend in the Transcasian Desert. After entering Turkestan the Heri-Rud assumes the name "Tejend." Its chief tributary is the

Keshaf from the west. The Transcasian Railroad crosses the lower reaches, and during high-water stages traffic is frequently suspended.

HERISAU, hā'rē-sou. A town of Switzerland, the capital of the Ausser-Rhoden division of the Canton of Appenzell, situated near the river Glatt, 4½ miles southwest of Saint-Gall (Map: Switzerland, D 1). The town is irregularly built, has a church tower reputed to date from the seventh century, a public library, an arsenal, a new town house, and a hospital. The manufactures comprise muslin, cotton, and silk, and the embroideries produced here are much in demand. In the vicinity are iron springs. Pop. (commune), 1900, 13,497; 1910, 15,502. Herisau was ruled by the abbots of Saint-Gall from the ninth century till the middle of the fifteenth, when it entered the Swiss Confederation.

HÉRISSON, ā'rēsōn', MAURICE, COUNT (1840-98). A French officer and publicist, born in Paris. He entered the army and took part in the Italian campaign and in the Chinese War, under General Montauban. In 1869 he was sent to America to make statistical studies. He returned to France at the outbreak of the Franco-Prussian War, was on the staff of General Schmitz and later an ordnance officer under General Trochu, and was present at the interview between Bismarck and Jules Favre at Ferrières. In 1875 he was sent on an archaeological expedition to Tunis and in 1891 was made head of the French militia in Congo. His main works are: *Études sur la Chine contemporaine* (1864); *L'Esprit chinois et l'esprit européen* (1869); *Journal d'un interprète en Chine* (1885); *Journal de la campagne d'Italie* (1889); *Les responsabilités de l'année terrible* (1891); *Les girouettes politiques* (1894).

HERISTALL, hēr'ī-stāl. A town in the Province of Liège, Belgium. See **HERSTAL**.

HERITABLE BOND, or **HERITABLE SECURITY**. In Scottish law, a bond or other obligation secured by the heritable property of the debtor. The security thus gained by the creditor was not unlike that created by a mortgage in the so-called Equity States of the United States, where a mortgage of lands is regarded more in the nature of a lien than as conferring the title to the mortgaged property on the mortgagee. In modern times it has taken on the form of the English and American mortgage of real property. See **MORTGAGE**.

HERITABLE JURISDICTIONS. A remarkable class of criminal jurisdictions held hereditarily from the crown of Scotland. These jurisdictions amounted to upward of 100 in number and consisted of sheriffships, stewardries, constabularies, but principally of regalities and baileries, with some offices of distinction. One of the more important was the office of the Lord Justice General, and the Lordship of Argyle and the Isles, both belonging to the family of Argyle. In virtue of their hereditary rights the possessors of these jurisdictions exercised an arbitrary power over vassals and others within the limits of their domain and could punish them by fines, scourging, imprisonment, and even in some cases with death, without interference of the common law. As repugnant to social policy, and more particularly with the view of extinguishing the authority of Highland chiefs over their clans, these heritable jurisdictions were abolished by Act of Parliament in 1747 (20 Geo. II, c. 43), the possessors receiving pay-

ment for the estimated value of their rights. The abolition of these jurisdictions was followed by the appointment of sheriffs and the placing of the administration of the law in Scotland upon a uniform and modern basis. Consult Hume, *Commentaries on the Law of Scotland Respecting Crimes* (Edinburgh, 1844).

HERJULFSON, hēr'yulf-sōn, BJARNI. The hero of an ancient Icelandic saga, according to which he was the first Norse discoverer of America. He was the son of Herjulf, one of the early settlers of Iceland. When he grew to manhood, he became a sea rover and spent most of his time abroad, returning only to pass alternate winters at his father's house. During one of his absences Herjulf removed to Greenland with Eric the Red, and, when Bjarni on his return to Iceland the following year (986) found his father gone, he determined to follow. Three days after he had left Iceland a storm arose, and the ship drifted for some time at its mercy. When at last the storm abated, the crew hoisted sail and came to a land covered with trees. As this could not have been Greenland, Bjarni refused to go ashore; so they sailed away, leaving the land on their left. Three times more they made the land, and the third time they found Eric's settlement in Greenland. News of the discovery they had made of a well-wooded country to the southward came to the ears of Leif Ericson (q.v.), son of Eric, and incited him to make his famous voyage to Vinland. Consult Reeves, *The Finding of Vineland the Good* (London, 1890).

HERKIMER. A village and the county seat of Herkimer Co., N. Y., on the Mohawk River and the Erie and Barge canals, 15 miles southeast of Utica, on the New York Central and Hudson River and the Otsego and Herkimer railroads (Map: New York, F 4). It has a public library, emergency hospital, and the Folts Mission Institute. The village is in a dairying region and manufactures knit goods, paper, office desks, beds, furniture, leather board, paper boxes, hardware, mattresses, etc. The water works and electric-light plant are owned by the village. Fort Dayton, of note in Colonial days, was situated in the northern part of Herkimer, and the village, prior to its incorporation in 1807, was known as Fort Dayton. Pop., 1900, 5555; 1910, 7520.

HERKIMER, NICHOLAS (?1715-77). An American soldier of the Revolutionary War. He was born probably in what is now Herkimer Co., N. Y. Nicholas served as a lieutenant of militia in the French and Indian War and was in command of Fort Herkimer in 1758, when the French attack on German Flats was made. In 1775 he was commissioned a colonel of militia and was chairman of the Committee of Safety of Tryon County. In the following year he was appointed a brigadier general of the New York militia and operated against Sir John Johnson. After Ticonderoga fell into the hands of Burgoyne's advancing army on July 7, 1777, Colonel St. Leger joined Sir John Johnson at Oswego and with a mixed force of 1800 British regulars, Loyalists, and Iroquois Indians under Joseph Brant, advanced towards Fort Stanwix (q.v.). The fort was invested on August 3, and two days later Herkimer, with a force of 800 hastily recruited militia and volunteers, marched to its relief. Apprised by his Indians of the advance of the relieving column, St. Leger arranged an ambush in a swampy ravine at Oriskany. The battle that ensued, perhaps the most obstinate

and murderous of the entire Revolution, was indecisive. The Americans held the field and drove their opponents off, but lost a third of their force in dead and wounded and were too weak to continue the advance. St. Leger's force, on the other hand, was so crippled and disorganized as to render out of the question both the continuation of the siege and the advance southward. Early in the fight Herkimer had his horse shot under him and his leg shattered by a musket ball; but, seated on his saddlebags underneath a tree, he continued calmly to smoke and shout out his commands until the fight was over. Ten days later he died, as a result of an unskillful operation. A monument 85 feet high was erected to his memory on the field of Oriskany in 1884.

HERKOMER, SIR HUBERT VON (1849-1914). An English painter, etcher, and mezzotint engraver, of German ancestry. He was born at Waal in Bavaria, the son of a cabinetmaker trained in Munich. In 1851 the family emigrated to the United States, where they spent six anxious years in New York, Rochester, and Cleveland, and in 1857 they settled at Southampton, England, where they continued their hard struggle for existence. Nevertheless, Hubert studied at the local art school and in 1865 in the preparatory school of the Munich Academy. On his return he studied at South Kensington under Frederick Walker and began to attempt illustrative work. His money difficulties being great, he did drawings for the firm of Dalziel Brothers and worked at decorative stenciling on the walls of one of the galleries of South Kensington. The foundation of the *Graphic* brought him his opportunity. One of his chief successes in this paper was "Chelsea Pensioners in Church," the first idea for the painting that established his reputation at the Royal Academy in 1874, sold for £1200, and in 1878 at the Paris Exposition brought him the Grand Medal of Honor. In 1873 he settled with his parents in Bushey, a suburb of London, where he founded the Herkomer School of Art in 1883. (Consult his *My School and My Gospel*, published in London in 1908.) He was Slade professor of fine arts at Oxford from 1885 to 1894, succeeding John Ruskin, and held a life professorship at Munich. He became an associate of the Royal Academy in 1879 and a member in 1890 and was knighted in 1907. He was an associate of the Institute of France and of the Belgian Academy, Officer of the French Legion of Honor, foreign Knight of the Prussian Order "Pour le Mérite," and honorary member of the Madrid Association of Spanish Artists. In 1882 he visited America, where he painted a number of portraits and delivered lectures in New York and Boston, repeating the visit in 1883 and in 1885 opening a studio in Boston. One result of his second visit was "Pressing to the West," a picture of immigrants in Castle Garden, New York. His reputation as a portrait painter was made by his likeness of Archibald Forbes, the war correspondent (1882).

Herkomer's work includes not only oil and water-color painting, but also excellent etchings and mezzotint engravings. He worked successfully in various branches of applied art, such as wood carving, wrought-iron work, and architecture, and also figured as a playwright, actor, magazine writer, musical composer, and singer. His paintings are excellent in drawing and good in color. Among them are: "After the Toil of Day" (1873); "Eventide" (1878); "Life, Light,

and Melody" (1879); "God's Shrine" (1880); "Der Bittgang," Bavarian peasants praying for harvest; "Gathering in the Charter House"; "The Magistracy of Landshut" (1893), which he presented to his native town. His portraits are marked by strong characterization and excellent technique. The best include: The "Lady in White," which took the Medal of Honor at the Berlin Exposition in 1886; the "Lady in Black," an American girl; the artist's father, Lorenz Herkomer, in the series "Makers of my House"; Wagner (1878); Ruskin (1881); Browning; Tennyson; Hans Richter (1883). Among his best-known water colors are: "Im Walde"; "The Wood Cutter's Rest"; "The Poacher's Fate"; "At the Well." Consult: Ludwig Pietsch, *Herkomer* (Leipzig, 1901); A. L. Baldry, *Hubert von Herkomer* (London, 1904); and his autobiography, *The Herkomers* (2 vols., New York, 1910-11).

HERKULESBAD, hēr'kōō-lās-bāt. See **MEHÁDIA**.

HERLIN, hēr'lén, FRIEDRICH (c.1435-99). A German painter, who was born in Rothenburg and who settled in Nördlingen in 1461. The only evidence that he studied in Flanders and worked in the studio of Rogier van der Weyden is that he painted in the style of that master, even borrowing from him figures and whole groups, and that in 1467 he was made citizen and town painter of Nördlingen "because of his acquaintance with Flemish methods of painting." In the Nördlingen Museum are his St. George altarpiece of 1460, a large "Ecce Homo," and a family altarpiece of 1488; in the church of St. James at Rothenburg, an altarpiece of 1466 and a picture of the Virgin of 1467; in the church of St. Blasius at Bopfingen, his altarpiece of 1472. Herlin's work is dominated by the religious spirit of the Middle Ages and is far inferior to that of Schongauer. While his Virgin is a beautiful woman and a loving mother, she is above all else a saint with strongly accentuated halo. Consult: Haack, *Friedrich Herlin* (Strassburg, 1900); Heidrich, *Alt-Deutsche Malerei* (Jena, 1909); Burkhart, *Friedrich Herlin, Forschungen* (Erlangen, 1912).

HERM (Lat. *Hermes*, from Gk. Ἑρμῆς. Some, however, derive the name from *Ἑρμα, *herma*, a prop or block of stone or wood. The plural is *Hermæ*). A quadrangular pillar, larger at the top than at the bottom, generally surmounted with a head of Hermes or Mercury. Such pillars were erected commonly in many parts of ancient Greece, especially in Attica, where they were used as milestones or as boundary marks, Hermes being the god of traffic, roads, and boundaries. Sometimes heads of other divinities, such as Athena and Eros, were combined with that of Hermes. Such a composite herm was called a *hermathena*, a *hermeros*, etc. The mutilation of the *hermæ* was regarded as a grievous misfortune. (See **MERCURY**.) The Romans used them for merely decorative purposes rather than with any religious significance. Many examples are preserved in European museums.

HERMÆ. See **HERM**.

HERMÆ, MUTILATION OF. See **ALCIBIADES**; **ANDOCIDES**; **HERM**.

HERMÆA, hēr-mē'a. 1. Festivals in honor of Hermes. (See **MERCURY**.) 2. A name given at times to the *Hermæ*. See **HERM**.

HERMAGORAS (Lat., from Gk. Ἑρμαγόρας). A famous Greek rhetorician of Temnos, who taught rhetoric at Rome during the earlier

half of the first century B.C., founder of a school of rhetoricians called *Hermagoræ*. He paid special attention to *inventio*, the part of rhetoric which dealt with the thinking out of the arguments likely to help one with his case. Strabo and Suidas ascribe to him Τέχνη Ῥητορικὴ, *Technai Rhetorikai, Manuals of Rhetoric*. Consult Piderit, *De Hermagora Rhetore* (Hersfeld, 1839); Thiele, *Hermagoras: Ein Beitrag zur Geschichte der Rhetorik* (Strassburg, 1893); Wilkins, Introduction to edition of the *De Oratore of Cicero* (2d ed., Oxford, 1888); Volkmann-Gleditsch, *Rhetoric und Metrik der Griechen und Römer* (3d ed., Munich, 1901).

HERMAN, ār'mān', ARMAND MARTIAL JOSEPH (1749-95). A French revolutionist, born at Saint-Pol. He was a lawyer and an ardent revolutionist, and in 1793, when he became intimate with Robespierre, he was appointed president of the Revolutionary Tribunal, and tried Marie Antoinette, Danton, and many others who were executed in that year. As Minister of Justice (1794) he continued his career of judicial murder. He was also Minister of the Interior and Commissioner of Police. Accused of being bribed by Robespierre in 1794 and of complicity with Fouquier-Tinville (1795), he was condemned on May 6 and guillotined the next day.

HERMAN, HENRY (1832-94). An English dramatist and novelist, born and educated, at a military college, in Alsace. He emigrated to America and served in the Confederate army during the Civil War, losing an eye as a result of a wound received in action. Afterward he removed to London and began to write for the stage. His first play, *Jeanne Dubarry*, was produced at the Charing Cross Theatre in May, 1875, and was followed the next year by *Slight Mistakes*, a farce. In November, 1882, was produced his first great success, *The Silver King*, written in collaboration with Henry Arthur Jones, with whom he also wrote *Breaking a Butterfly* (1884; Ibsen's *Doll's House*) and *Chatterton* (1884). He then wrote *Claudian* (1884), with William Gorman Wills, and *The Golden Band* (1887), with Freeman Wills; *For Old Virginia* (1891); *Eagle Joe* (1892); and *Fay o' Fire* (1885), a romantic opera, for which Edward Jones composed the music. Between 1887 and 1891 he wrote several novels in collaboration with David Christie Murray, such as: *One Traveler Returns* (1887); *A Dangerous Catpaw* (1889); *The Bishop's Bible* (1890); *He Fell among Thieves* (1890); and *Paul Jones's Alias* (1891). He also wrote alone a large number of novels. In the plays in which he collaborated he showed a remarkable faculty of invention, the plots being chiefly of his making, while characterization and the rest were left to his fellow workmen.

HERMANDAD, ār'mān-dād', THE (Sp., brotherhood). A name given to the confederations formed by Spanish cities in the Middle Ages for the defense of their liberties and the preservation of public order. The first Hermandad was formed in Aragon about the middle of the thirteenth century; this example was followed in Castile about 1275, and in 1295 34 cities of Castile and Leon formed a very powerful association with the twofold object of defense against the nobles and against unjust taxation; they took a mutual oath to punish summarily any noble who committed a wrong against any member of the Hermandad and was unwilling to make suitable redress, or any one who

levied an unjust tax upon any of the allied cities, even if the tax was authorized by royal decree. The Hermandads were favored by the kings of the various countries, as they were a useful check upon the nobles, whose power was a menace to the royal authority, and were also a means of maintaining public order. In fact, during much of the fourteenth and fifteenth centuries the Santa Hermandad—or Holy Brotherhood, as it came to be called—was the principal instrument for maintaining public peace and curbing the excesses of the unruly nobles, against whom the kings were almost powerless. They were so successful that Isabella of Castile decided to make use of them; in 1476 she had a law enacted by the Cortes for the reorganization of the Hermandad and its extension to include all the cities in her kingdom. After that a general junta was held once a year, and instructions sent to the provincial juntas. The jurisdiction of the Santa Hermandad included burglary, rape, resistance of justice, and all acts of violence or robbery committed on the highways or in the open country; for these crimes the penalties were prescribed very minutely in the codes of law which were enacted in the annual assemblies of the association. The Hermandad maintained a force of officials (the *quadrilleros*) and horsemen to enforce its decrees and arrest defenders; the expenses of equipment and maintenance of this force were met by an annual assessment upon each 100 householders. The Hermandad in Castile exercised its great powers for only about a score of years. It was very much disliked by the nobles, and as soon as public order had been secured and the royal power strengthened, the Hermandad was deprived of most of its authority; this happened about the close of the fifteenth century. Fifty years later it had become little more than a state police. In 1485 the Hermandad of Castile published its code of laws known as the *Quaderno de las Leyes Nuevas de la Hermandad*. In 1487 a similar association was sanctioned in Aragon and later suffered the same fate as the one in Castile. Consult Mariana and Miniana, *Historia General de España* (10 vols., Madrid, 1794), and Prescott, *History of Ferdinand and Isabella* (4 vols., Philadelphia, 1904).

HERMANFRID, hër'mán-frèt (?–531). The last King of the Thuringians, son of Basinus. He ruled at first with his two brothers, Baderich and Berthar, but, urged on by his ambitious wife, Amalberga, killed Berthar and joined with Theuderich I, King of the Franks, against Baderich, who was defeated and dethroned in 516. Hermanfrid now refused to give up half of his kingdom, as he had promised, to Theuderich. The latter joined Clotaire I, his brother, and the Saxons, in a grand alliance against Thuringia, and dethroned Hermanfrid in 531. One story says that he was killed by his own armor bearer. Another tells how he was lured to Zülphich and pushed over the city wall. Amalberga went to Italy with her children, the bulk of Thuringia was joined to the kingdom of the Franks, and the Saxons took the northern part. The story of Hermanfrid has been dramatized by Wetzel (1818) and by Schlönbach (1854).

HERMANN. A city and the county seat of Gasconade Co., Mo., 81 miles west of St. Louis, on the Missouri River and on the Missouri Pacific Railroad (Map: Missouri, E 3). It is the centre of extensive vine-growing interests and

manufactures wine, in which there is an important trade, beer, shoes, lumber, flour, foundry products, etc. The picturesque scenery of the vicinity attracts many excursionists during the summer. The water works and sewage system are owned by the city. Pop., 1900, 1575; 1910, 1592.

HERMANN, hër'mán. The leader of the Cherusci in their celebrated victory over the Roman legions of Varus (9 A.D.), known to the Romans as Arminius (q.v.).

HERMANN, COUNT OF WIED (1477–1552). Archbishop and Elector of Cologne, born at Wied. He was elected Archbishop of Cologne in 1515 and supported the claims of Charles V, whom he crowned at Aix-la-Chapelle in 1520. The next year, at the Diet of Worms, he strongly opposed heresy and endeavored to have Luther declared an outlaw, in spite of the fact that he himself was striving to bring about a reform, though within the Church. In 1542 he invited Bucer and, in 1543, Melancthon to Cologne. His attempts at reform were fruitless. He was outlawed by the Emperor and banned by the Pope. The Emperor then secured the election of Adolf of Schaumburg to the archbishopric, and Hermann withdrew to his Earldom of Wied, where he died a few years later. Consult M. Deckers, *Hermann von Wied, Erzbischof und Kurfürst von Köln* (Cologne, 1840), and Varentztrapp, *Hermann von Wied und sein Reformationsversuch in Köln* (Leipzig, 1878).

HERMANN, FRIEDRICH BENEDIKT WILHELM VON (1795–1868). A German political economist. He was born in Bavaria and studied at the universities of Erlangen and Würzburg. His attention was early directed to mathematics and political economy. In 1823 he became privatdozent at the University of Erlangen; in 1825 he was called to the professorship of mathematics at the Gymnasium of Nuremberg; and in 1827 he became professor extraordinary of *Kameralwissenschaften* in the University of Munich. His great work, *Staatswirtschaftliche Untersuchungen*, which appeared in 1832, ranks as one of the most important contributions to German economics. In 1835 he was made member of the Royal Bavarian Academy of Science. He was inspector of technical instruction in Bavaria; in 1845 was appointed one of the councilors to the Minister of the Interior; and in 1848 sat as a member for Munich in the National Assembly at Frankfort, where he was one of the founders of the so-called "Great-German party," which opposed the rise of the hegemony of Prussia; in 1850 he assumed charge of the Bureau of Statistics, and in 1855 he became Councilor of State. He published a large number of pamphlets and papers on political, economic, and industrial subjects, and the annual reports which he published as head of the Bureau of Statistics entitle him to the rank of one of the founders of the science of statistics.

HERMANN, GOTTFRIED (1772–1848). A distinguished German classical scholar, born at Leipzig. After study at Leipzig and at Jena he lectured on classical literature at the University of Leipzig and became professor extraordinary of philosophy there in 1798. All the rest of his life was spent at this university; he became professor of eloquence there in 1803, and from 1809 to his death was professor of poetry as well. He showed his originality first in his discussions of the principles of metre;

he used as the groundwork of his metrical theories the philosophical categories of Kant. Noteworthy works on metre were his *Handbuch der Metrik* (1798) and two treatises in Latin—*Elementa Doctrinæ Metricæ* (1816) and *Epitome Doctrinæ Metricæ* (1818); the last-named work reached a third edition in 1852. He gained even greater fame by his method of studying the classics. He regarded the text of the classical authors, together with questions of grammar and metre and style, as the main object of study, on the ground that a thorough knowledge of the Greek and Latin languages is the indispensable foundation for real knowledge of classical antiquity. This method, grammatical and critical in character, in opposition to the historical-antiquarian school represented by Boeckh (q.v.) and Niebuhr (q.v.), he set forth in his *De Emendanda Ratione Græcæ Grammaticæ* (1801); he applied it in his many editions of classical authors, especially of the Greek tragic poets, and in his *Opuscula* (7 vols., Leipzig, 1827-30). Consult: Jahn, *Gottfried Hermann, eine Gedächtnissrede* (ib., 1899); Köchly, *Gottfried Hermann* (Heidelberg, 1874); Bursian, *Geschichte der klassischen Philologie in Deutschland* (Munich, 1883); Sandys, *A History of Classical Scholarship*, vol. iii, pp. 89-95 (Cambridge, 1908). See CREUZER.

HERMANN, KARL FRIEDRICH (1804-55). A German classical scholar. He was born at Frankfurt-on-the-Main, was educated at Heidelberg and Leipzig, and studied in Italy. In 1832 he was appointed professor of classical philology at the University of Marburg, and in 1842 succeeded Otfried Müller as professor of philology and archæology at the University of Göttingen, where he remained until his death. Hermann was best known for his studies in Greek antiquities and Greek philosophy. His principal works were his *Lehrbuch der griechischen Antiquitäten* (6th ed., 1882-92), a standard work on Greek antiquities; *Geschichte und System der platonischen Philosophie* (1839); *Kulturgeschichte der Griechen und Römer* (1857-58); and text additions of Plato (6 vols., 1851-52), Juvenal's *Satires* (1854), and Persius (1854). Consult Lechner, *Zur Erinnerung an Karl Friedrich Hermann* (Berlin, 1864), and Sandys, *A History of Classical Scholarship*, vol. iii (Cambridge, 1908).

HERMANN, LUDIMAR (1838-). A German physiologist. He was born in Berlin, studied medicine there, and became (1865) lecturer in physiology at the University of Berlin. He was made professor at Zurich in 1868 and at Königsberg in 1884. To him and to Pfüger is due the commonly accepted explanation of the nature of metabolism. He did much to disprove Du Bois-Reymond's theory of animal electricity; and his studies of phonograph markings and analysis of curves on these records were of prime importance. In 1886 he became editor of the *Jahresbericht über die Fortschritte der Physiologie*. Among his principal books are: *Grundriss der Physiologie des Menschen* (1863; 14th ed., 1910); *Lehrbuch der experimentellen Toxikologie* (1874); the particularly valuable *Untersuchungen zur Physiologie der Muskeln und Nerven* (1867-68); and the *Handbuch der Physiologie* (1879-83), of which he was general editor and part author. His brief discussion of vivisection, *Die Vivisectionsfrage* (1877), was translated into English by Dickson.

HERMANN, ROBERT (1869-). A Swiss

composer, born at Bern. Largely self-taught, he was for only a few months at the Frankfurt Conservatory in 1891, and in 1893-94 with Humperdinck. In 1895 the Berlin Philharmonic Orchestra gave his *Symphony in C*. Although little known even in Germany, he is one of the most original of contemporary composers, one who makes no concessions to prevailing tendencies or fashions. His art is founded on Bach and is essentially diatonic. Perhaps the most salient feature of his works, setting them entirely apart from those of all contemporaries, is economy in modulation and absence of mere "effects." His themes are wonderfully impressive and plastic and always elaborated with a master's hand. His works include two symphonies, in *C*, op. 7, and *B minor*, op. 11; a concert overture, a *Berceuse* for horn and string orchestra, chamber music, and songs. Consult W. Niemann, "Robert Hermann," in *Monographien Moderner Musiker*, vol. iii (Leipzig, 1909).

HERMANNSTADT, hēr'mān-stāt, Hung. **NAGY-SZEBEN**, nōd'y'-sē'bēn (Lat. *Oibinium*). An important town of Hungary, formerly the capital of Transylvania, now chief city of the County of Szeben, beautifully situated in the fertile valley of the Cibin (Hung. *Szeben*), an affluent of the Aluta, about 70 miles west-northwest of Kronstadt (Map: Hungary, J 4). Hermannstadt is the seat of a Greek archbishop and of a Lutheran superior consistory; possesses a baronial palace with picture galleries, a museum, a library of more than 100,000 volumes, and a number of fine churches. It has a law school, a theological seminary for the Greek church, and a military school. Tanning, wax bleaching, and the making of cloth, linen, shoes, soap, ropes, combs, paper, and gunpowder are among the chief industries. Pop., 1900, 23,304; 1910, 25,008, of whom two-thirds are Germans and the rest Magyars and Rumanians. Hermannstadt is the principal town in the so-called Saxon Land and is supposed to have been founded by German colonists in the twelfth century.

HERMANN UND DOROTHEA, dōnt dō'rō-tā'a. An idyllic poem by Goethe (1797).

HERMANN VON FRITZLAR, fōn frīts'lār. A German mystic of the fourteenth century. Of his life we know merely that he came from Fritzlar in Hesse, and that he traveled through Europe, visiting the tombs of the saints. It is surmised that he was a rich layman. He wrote *Die Blume der Schauung*, a speculative work now lost, and a mystical *Heiligenleben*, preserved in a manuscript written under his own supervision. This valuable document for the reconstruction of German mysticism in the fourteenth century is edited by Pfeiffer, in his *Deutsche Mystiker* (Leipzig, 1845).

HERMANN VON REICHENAU, rī'ke-nou, **HERMANN DER LAHME**, or **HERMANNUS CONTRACTUS** (1013-54). A German poet and mathematician. He was the son of the Swabian Count Wolverad. From childhood his limbs were painfully contracted, whence the name by which he is generally known. He attended a monastic school at Reichenau and at the age of 30 joined the brotherhood. He was an earnest and successful teacher and drew about him a zealous body of pupils from various places. He wrote a treatise on the abacus (published by Treutlein in the *Boncompagni Bullettino*, vol. x, Rome, 1877) and did much to extend the knowledge

of the column computation. Unlike Gerbert (see SYLVESTER), however, he seems to have had no knowledge of the Hindu numerals. He also wrote on a number game, "Rhitmomachia," and on the use of the astrolabe (q.v.). He is best known, however, for his *Chronicon*, a work on history down to the year of Hermann's death. It was continued by Berthold (ed. by Pertz, vol. v of *Monumenta Germaniæ Historica*, 1844; and trans. by Nobbe, 1892). Among his poems are *De Octo Vitiis Principalibus* (ed. by Dümmler, in *Zeitschrift für deutsches Altertum*, vol. xiii) and the Latin hymns *Salve Regina* and *Alma Redemptoris Mater*. Consult G. H. Pertz, *Die Geschichtschreiber der deutschen Vorzeit*, vol. v (Berlin, 1847), and Hansjakob, *Hermann der Lahme von der Reichenau* (Mayence, 1875).

HERMANN VON SALZA, zäl'tsä (c.1170-1239). Grand Master of the Teutonic Order, probably descended from the lords of Salza in Thuringia. He became Grand Master in 1210 and raised the order to an enviable position both in the East and in Europe. He took part in the Fifth Crusade in the company of Frederick II. Although his headquarters were in Venice, his duties kept him continually traveling, in Egypt, Palestine, Italy, and Germany; several times he acted as arbitrator in the quarrels between the Pope and Emperor Frederick II. Carlyle says of him: "He is reckoned the first great Hochmeister . . . fourth in the series of masters; perhaps the greatest to be found there at all, though many were considerable." Consult Carlyle, *History of Frederick the Great*, vol. i (New York, 1899), and Koch, *Hermann von Salza, Meister des Deutschen Ordens* (Leipzig, 1885). See TEUTONIC KNIGHTS.

HERMANRICH, hēr'mán-rik (c.269-375). The first historically accepted King of the Ostrogoths, variously called Hermanrich, Ermanarich, Ermanrich, and in myth Ermrich. He was the founder of a great Ostrogothic power about the middle of the fourth century, when he conquered many Slavic and Finnish tribes, so that the saga makes him rule from the Black Sea to the Baltic. The Visigoths recognized his overlordship. A story makes him order that Swanhilde, wife of a defeated prince, be torn asunder by horses, for which Hermanrich is slain by her three brothers. According to another tradition he is said to have put an end to his life, at the age of more than 100 years, when he saw that he was about to be attacked by the King of the Huns, Balamir, who killed his son and took part of his kingdom. Consult Bradley, *The Story of the Goths* (New York, 1888).

HERMAPHRODITE (Lat. *hermaphroditus*, from Gk. Ἑρμαφρόδιτος, son of Hermes and Aphrodite, from Ἑρμῆς, *Hermēs*, Hermes + Ἀφροδίτη, *Aphrodītē*, Aphrodite). An obsolete term in botany, formerly used to designate those flowers that contain both stamens and pistils, these organs then being regarded as sexual.

HERMAPHRODITE BRIG. See BRIG.

HERMAPHRODITISM. See SEX.

HERMAPHRODITUS. According to a late story of Greek mythology, the son of Hermes and Aphrodite, born on Mount Ida, where he was brought up by naiads. Going in his fifteenth year to Caria, he rejected the love of Salmacis, the nymph of a fountain in which he bathed. Salmacis finally, embracing him, prayed to the gods to unite her to the boy forever, and a being resulted half male and half female.

(See Ovid, *Metamorphoses*, iv, 285-388.) The origin of the dual conception is probably to be found in the Cyprian Aphroditus, worshiped in connection with Aphrodite; there Hermaphroditus was worshiped originally as a deity. The ultimate source of such dual beings was the Orient. The form in which Hermaphroditus is represented in art was fixed by Polydorus (q.v.). It became a favorite subject for sculpture in the late Greek and Græco-Roman period. Consult "Hermaphroditos," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HERMAS, SHEPHERD OF (Lat., from Gk. Ἑρμᾶς). The title of a work (in Greek), written by a Christian of the second century who lived in Rome; it is included among the works of the Apostolic Fathers (q.v.). Hermas was a well-to-do freedman and a brother of Pius, Bishop of Rome about the middle of the second century. He was an earnest, simple-minded Christian, with little education or culture, but typical, no doubt, of many in the Church of his day. Some later writers, like Jerome, confuse him with the Hermas mentioned in Rom. xvi. 14, which is not surprising in view of the fact that he refers to persons and events of the Apostolic age as if they were contemporary. Parts of the *Shepherd* may have been written as early as 110 A.D., but other parts are obviously later, and the work was probably complete before 145 A.D.

The book takes its name from one of its principal characters, an old man in shepherd's garb, who appears at the close of the first part and thereafter attends Hermas as a sort of guardian, committing to his charge certain divine commands. The general theme is repentance and the duty of moral strenuousness. The book is divided into (1) five "Visions," which form the introduction; (2) 12 "Mandates," or commandments respecting the Christian life, and (3) 10 "Similitudes," or parables, which picture among other things the progress of the Church. The whole forms an important source for our knowledge of second-century Christianity in Rome, with its temptations to worldliness and the moral insight of its finer spirits. Here and there it shows close resemblances to the Epistle of James. Visions and revelations play such an important part in the book that it is properly classed among early Christian apocalypses. A few recent critics hold that it was originally a Jewish book which received Christian revision and enlargement, but this is doubted by most.

In the early Church the *Shepherd* was often classed among the "Scriptures," i.e., among what we call the canonical books of the New Testament. Irenæus cites it as "Scripture," and Clement of Alexandria and Origen esteemed it highly. It was often read in public worship. Tertullian, on the other hand, speaks slightly of its moral teaching. In the fourth century it was still held in honor, as Eusebius and Jerome testify, but it was no longer reckoned in the sacred canon.

The Greek text is edited by Gebhardt and Harnack (Leipzig, 1877), by Funk (Tübingen, 1901), and, with English translation, by Lightfoot, *Apostolic Fathers*, edited by Harmon (London, 1893); the *Codex Sinaiticus* of Hermas was edited by Lake (Oxford, 1911). An English translation is given in vol. i of the American edition of *Ante-Nicene Fathers*, edited by Roberts and Donaldson (Buffalo, 1886). In general

consult: Cruttwell, *Literary History of Early Christianity*, vol. ii (London, 1893); Krüger, *History of Early Christian Literature* (New York, 1897); Harnack, *Chronologie der altchristlichen Literatur*, vol. i (Leipzig, 1897); Taylor, *The Shepherd of Hermas* (New York, 1901).

HERMATHENA. See **HERM.**

HERMENEGILD, hër'me-ne-gild (c.560-c.610). Son of Leovigild, King of the Visigoths, and centre of a Catholic legend. In 580 he rebelled against his father to induce him to become a Catholic, says the story, although there is no evidence that Hermenegild was a Catholic apart from the fact that he married Ingunthis, daughter of Sigibert and Brunhilda, who was orthodox. The son was defeated by his father and driven into exile. The legend makes him martyred by his father, whose second wife was an Arian. He was canonized by Pope Sixtus.

HERMENEUTICS. See **EXEGESIS.**

HERMEROS. See **HERM.**

HERMES, hër'méz. See **MERCURY.**

HERMES, OR A PHILOSOPHICAL INQUIRY CONCERNING UNIVERSAL GRAMMAR. A technical work by James Harris, much influenced by Aristotle, published in 1751.

HERMES, hër'més, GEORG (1775-1831). A German Roman Catholic theologian and philosopher, born in Dreyerwalde, Westphalia. His student life was passed in Münster, where he afterward taught at the Gymnasium (1798-1807) and lectured with marked success at the Academy (1807-19). In 1799 he was ordained to the priesthood. In 1820 he went to the University of Bonn, where he spent the remainder of his life. As a professor of theology, Hermes achieved the distinction of being the founder of a "school," known after him as the Hermesians. It was not long before all his colleagues at Bonn recognized him as their leader. It is said that his influence was sufficient to prevent the appointment of Möhler and Döllinger to professorships there. In Breslau, too, he gained many adherents. Spiegel, Archbishop of Cologne, was an active and powerful supporter of the new movement, and until his death (1836) the Hermesians were in high favor throughout the provinces of the lower Rhine. There seems to have been no doubt of their orthodoxy or of their loyalty to Catholicism, and so long as Hermes lived hardly a sign of opposition appeared. He died in 1831, at peace with the Church, and generally recognized as one of the foremost leaders of German Catholicism.

Four years later (1835), to the astonishment of the Hermesian party, Pope Gregory XVI issued a brief condemning Hermes's teaching and prohibiting his writings. The sections especially objectionable related to the nature of faith and of divine revelation, the authority of Scripture and tradition, the necessity of grace, the evidence of God's existence, and the idea that through reason men could gain a knowledge of supernatural truth. Such teaching was declared to lead towards skepticism and indifference.

Since the year 1832 the party had had an organ, the *Zeitschrift für Philosophie und katholische Theologie*. In its columns and elsewhere defenses at once began to appear. The Hermesians declared that the Pope had been misinformed by persons who were ignorant of philosophy and theology alike. It was freely admitted that the doctrines specified in the papal brief were heterodox, but it was alleged that

these were not the doctrines of Hermes; that neither he nor his school had ever held or taught them. At this point the similarity of their defense to that adopted long before by the Jansenists should be noticed. So confident were they that the Pope was wrong that two of the Bonn professors (Braun and Elvenich) undertook a mission to Rome to persuade him to withdraw the brief. They found, however, that their hopes were baseless, and they were forced to return without having accomplished anything. About 1838 philosophical criticism began to add its strength to the opposition which had already developed in other quarters, and the decline of Hermesianism was rapid. The two Bonn professors, Braun and Achterfeldt, who had been most active in defense of Hermes's memory, retired in 1844. They were not subjected, however, to any ecclesiastical censure. Before the middle of the century the whole movement had become a matter of history. Hermes was strongly influenced by the critical rationalism of Kant and Fichte, and grounded theology upon reason, which he distinguished as theoretical and practical. The system is an interesting attempt to combine a critical philosophy with catholic orthodoxy.

Hermes's writings are few. Their titles are: *Ueber die Wahrheit des Christentums*, which appeared in 1805; *Einleitung in die christkatholische Theologie*, in two parts (1819 and 1829); *Christkatholische Dogmatik* (1834), published posthumously under the editorship of Achterfeldt. In general consult: Niedner, *Philosophia Hermesii Explicatio* (Leipzig, 1838); Braun and Elvenich, *Acta Romana* (Hanover, 1838); Werner, *Geschichte der katholischen Theologie* (Munich, 1866); Lichtenberger, *History of German Theology in the Nineteenth Century* (Edinburgh, 1889). For a bibliography, consult Gla, *Repertorium der katholisch-theologischen Literatur*, vol. i (Paderborn, 1904).

HERMES (hër'méz) CARRYING THE INFANT DIONYSOS. A masterpiece of Praxiteles, found in 1877 at Olympia and now preserved in the museum there. The figure of the god is the most perfect example extant of the Greek conception of youthful masculine beauty. Hermes stands leaning his left arm, draped with a cloak, on a tree stump and holding the infant god of wine. His right arm is missing, but evidently the raised hand held some object for the babe's amusement. See **PRAXITELES.**

HERMESIANAX ('Ερμηνιάναξ). A Greek elegiac poet, who lived in the time of Alexander the Great and was a native of Colophon in Asia Minor. He was popular, even down to the Augustan age. His chief work was *Λέβριον*, an elegiac poem in three books, addressed to his mistress, Leontium. The fragment of 98 lines of the third book preserved by Athenæus (q.v.), in book xiii, describes, in a somewhat disconnected though not ungraceful style, the love stories of the poets and sages from Orpheus down to Philetas. Consult the editions by Bailey (London, 1839; this contains an English translation), by G. Hermann in his *Opuscula* (Leipzig, 1828), and by Bergk in his *Anthologia Lyrica* (2d ed., ib., 1868); also Bergk, *De Hermesianactis Elegia* (Marburg, 1845); Susemihl, *Geschichte der griechischen Literatur in der Alexandrinerzeit* (Leipzig, 1892); Christ-Schmid, *Geschichte der griechischen Literatur*, vol. ii (5th ed., Munich, 1913).

HERMESIANISM. See HERMES, GEORG.

HERMES OF AN'DROS. A statue in the National Museum at Athens, wrongly so called. It does not represent the god, but is a portrait statue belonging to a tomb and is considered the best example of this class of statues. It dates from the fourth century B.C.

HERMES OF PRAXITELES. See HERMES CARRYING THE INFANT DIONYSOS; PRAXITELES.

HERMES, hûr'méz, or MERCURY, REPOSING. A life-size bronze statue, found at Herculaneum, now in the Museo Nazionale at Naples. It represents the youthful messenger of the gods seated and leaning forward with limbs relaxed. The attitude is lifelike, and the statue is one of the most famous extant representations of the god.

HERMES TRISMEGISTUS. See HERMETIC.

HERMETIC (ML. *Hermeticus*, relating to Hermes, from *Hermes*, Gk. Ἑρμῆς, *Hermes*). The ancient Egyptians considered the god Dhouti, or Thoth, identified by the Greeks with their god Hermes, as the patron of literature and the scribe of the gods. Therefore several magical and religious texts, partly embodied in the *Book of the Dead* (q.v.), were reputed to have been written by this god with his own hands. As such writings could claim the most direct inspiration, the word "Hermetic" was applied, in Greek times, to writings of the highest degree of sanctity, and served in a general way to designate all inspired books. Clemens of Alexandria states that the Egyptian priests had to study 42 (i.e., the number of assessors of Osiris) sacred or Hermetic books, divided into six subjects: sacred law, ritual, science, astrology, hymnology, and medicine. It is questionable if such a canon existed throughout Egypt. The claim that the great medical papyrus discovered by Ebers was one of these Hermetic books has not been substantiated. In early Christian times it was customary to ascribe a certain type of magical and gnostic writings in Greek to Hermes Trismegistus, who lost his divine personality more and more and came to be regarded as a great magician. These pseudographs often claimed to have been translated from the Egyptian, although they bear a thoroughly Greek character and mostly exhibit un-Egyptian ideas of Jewish, Neoplatonic, etc., origin. They may, however, have been written in Egypt. The most noticeable product among them is *Hermes Trismegistus* (most recent edition by Parthey, Berlin, 1854). These writings exercised a strong influence upon the various secret sciences; hence the term "Hermetic" became very popular in alchemy and astrology, and some mediæval writings claim the title of Hermetic books. Hermetic medicine meant the most mysterious and powerful medicine, and the expression "hermetic sealing," for the most complete air-tight closure, has survived to our own day.

Bibliography. Dufresnoy, *Histoire de la philosophie hermétique* (Paris, 1742); Baumgarten-Crusius, *De Librorum Hermeticorum Origine atque Indole* (Jena, 1827); Hilger, *De Hermetis Trismegisti Poëmandro* (Leipzig, 1855); Ménard, *Hermès Trismégiste* (Paris, 1866); Pietschmann, *Hermes Trismegistus* (Leipzig, 1875); Reitzenstein, *Poëmandres: Studien zur griechisch-ägyptischen und frühchristlichen Literatur* (ib., 1904).

HERMIA, hēr'mi-ā. An Athenian lady in Shakespeare's *Midsummer Night's Dream*.

HERMIAS (Lat., from Gk. Ἑρμίας, *Hermias*, or Ἑρμείας, *Hermēias*). A slave of Eubulus, tyrant of Atarneus and Assos in Asia Minor, whom he subsequently succeeded on the throne (347 B.C.). At Athens he had previously made the acquaintance of Plato and Aristotle (q.v.). The latter spent some years at the court of Hermias, but fled when Artaxerxes III captured the tyrant and put him to death. Aristotle, who married Pythias, one of the relatives of Hermias, erected a statue in Hermias' honor.

HERMINJARD, ār'mē'nyār', AIMÉ LOUIS (1817-1900). A Swiss author, born at Vevey, Vaud. He was a teacher and practiced his profession in Russia, Germany, and France, before going to Geneva, where he became a friend of Amiel (q.v.). His great work, the *Correspondance des réformateurs dans les pays de langue française*, began to appear in 1866 (vol. ix, covering the period 1543-44, in 1897).

HERMIONE, hēr-mi'ō-nē. 1. The beautiful daughter of Menelaus and Helen, married against her will to Neoptolemus (Pyrrhus), the son of Achilles, in performance of a promise made by her father. According to late tradition, she was carried off by Neoptolemus (q.v.), who was killed by Orestes, to whom she had already been promised. 2. The much-injured wife of Leontes, the madly jealous King of Sicily, in Shakespeare's *Winter's Tale*. The character is taken from Bellaria, in Greene's *Pandosto*. 3. The scornful love of Pyrrhus and loving mother of Astyanax, in Racine's *Andromaque*. After Andromache has persuaded Orestes to murder Pyrrhus, in the act of ascending the altar with Hermione, the latter becomes Regent of Epirus.

HERMIONES, or HERMINONES. According to Tacitus, *Germania*, 2, one of the three great divisions of the German peoples, so named from their mythical progenitor Irminus, or Erminas. They were the oldest, best, and most powerful of the West-Germanic stock. Their eastern boundary was formed by the Vistula and the Carpathians. Among the nations to whom the name "Hermiones" was applied were the Suevi, the Hermunduri, the Lombardi, the Vandali, the Heruli, and the Quadi. Their early home was about the basin of the Elbe and the Main. Consult: Stubbs, *Constitutional History of England* (6th ed., Oxford, 1897); Müllenhoff-Roediger, *Deutsche Altertumskunde*, vol. iv (Berlin, 1900); and the editors on Tacitus, *Germania*, 2.

HERMIPPUS OF SMYRNA (Gk. Ἑρμίππος, *Hermippus*). A Greek philosopher who lived about 200 B.C. A disciple of Callimachus of Alexandria, he was called ὁ Καλλιμάχειος, the Callimachean. He was the author of *Bioi, Bioi*, a work containing the biographies of Greek philosophers, rhetoricians, historians, and poets. Though it is repeatedly referred to by later writers, only fragments have been preserved. Consult: Müller, *Historicorum Græcorum Fragmenta* (Paris, 1868-83); Leo, *Die griechisch-römische Biographie* (Leipzig, 1901); "Hermippus, 6," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HERMIT (from OF. *hermite*, *ermite*, from Lat. *eremita*, from Gk. ἐρημίτης, *erēmītēs*, hermit, from ἐρημία, *erēmia*, desert, from ἐρήμος, *erēmos*, quiet; connected with Gk. ἡρέμα, *ērēma*, quietly, Goth. *rimis*, quiet, Skt. *ram*, to rest). Properly any one who lives in solitude. In religious

usage one who retires from the world to solitude in order to develop the spiritual life. Before the rise of Buddhism (500 B.C.) Hindu ascetics had begun to seek freedom from the world by a hermit life, and the Laws of Manu give elaborate rules for the life of the forest hermit. Buddhism carried this form of asceticism into other parts of Asia, so that it may have influenced the growth of the Jewish Essenes (see ESSENES) and the Therapeutæ in Egypt, precursors of the Christian hermits. Hermit life began among the Christians in the period of the early persecutions, but its great popularity arose from the influence of St. Antony. (See ANTONY, SAINT, OF THEBES.) Some hermits always lived lives of solitude, as the name implies (see ANCHORITE); but so strong is the human social instinct that even in the time of St. Antony other hermits took up their abodes near his and sought his leadership. Communities of hermits were formed, each dwelling apart but meeting for a common worship and with sometimes other elements of a common life. The life was called cenobite. Such communities sometimes grew into separate orders, which perpetuated themselves in the Church. (For some of the more important, see AUGUSTINIANS; CELESTINES; HIERONYMITES; PAULITES.) The Church has had all gradations between hermits of complete solitude and communities where solitude was reduced to a short period daily; but the modern emphasis upon social service has largely set aside the hermit ideals. A vivid picture of early hermit life is found in Ebers's story, *Homo Sum*. Consult: Richard Challoner, *Lives of the Fathers of the Eastern Deserts* (New York, 1852); J. O. Hannay, *Wisdom of the Desert* (ib., 1904); Ida, gräfin von Hahn-Hahn, *Fathers of the Desert* (2 vols., ib., 1907).

HERMITAGE, THE. 1. A celebrated palace and museum at St. Petersburg (q.v.). 2. A garden on the side of a hill overlooking Moscow, Russia, which has become a noted fashionable resort. 3. The name given to Rousseau's retreat in the valley of Montmorency, France. It was built for the philosopher by Madame d'Épinay and was occupied by him from 1751 to 1757. 4. An old house near Nashville, Tenn., where Andrew Jackson resided for a great part of his life, and near which he was buried. The mansion is now owned by the State.

HERMIT CRAB. One of a numerous group of small crabs (see CRAB) of the tribe Paguridea and the family Pagurida. These crustaceans, common in the rock pools on every coast, live in the deserted shells of whelks and other gastropod mollusks, which they carry about with them as portable shelters. Their entire body is specialized and adapted to this unusual mode of life. The abdomen, unlike that of lobsters and shrimps, is soft, wholly lacking the hard, chitinous outer skeleton, and is wound in a spiral shape corresponding to the mold of the shell which forms its protection. As there is no need for swimming, the finlike tail fan is adapted for holding the animal firmly in the shell. It forms usually a curved hook, which, often aided by suckers, will not release its hold even when the animal is torn asunder. The remaining abdominal appendages are either absent, asymmetrically reduced, or, in the female, adapted for carrying the eggs. When alarmed, the hermit crab withdraws into the borrowed shell and blocks up the aperture with one of its claws, which is much larger than the other.

When the crab remains in one shell for some time, colonies of hydractinias or single anemones usually find a foothold on the surface. The association in the latter case is a commensal one (see COMMENSALISM)—the crab receiving protection from the stinging powers of the anemone, while that sedentary creature is enabled to find an abundance of food in the course of its involuntary travels. That the advantages of this relationship are not wholly unconscious is shown by some hermits, which, when forced to change their dwelling place, carefully detach the anemone and replant it on their new roof. In some cases the anemone dissolves the shell, and thereafter the fortunate hermit dwells within walls, living, fleshy, and elastic. Another species supports the anemone upon its claw, so that the stinging tentacles effectively guard the entrance. Hermit crabs are most amusing inmates of an aquarium, but they are too lively and predacious to be confined with delicate and valuable creatures. They feed on mollusks, small fish, vegetation, and carrion of all sorts. When, from increase of size, they find it necessary to change their shell, they become greatly concerned, trying on shell after shell until they find one which fits, whisking their unprotected abdomens in and out to avoid injury. They are very quarrelsome and constantly strive to rob one another of their shells.

One of the commonest American species (*Eupagurus longicarpus*) is of small size, seldom more than an inch in length, and is found in large numbers in tide pools on rocky coasts from Massachusetts to South Carolina. A somewhat larger species (*Eupagurus pollicaris*) reaches Florida and is usually found in the shell of *Natica*. The whelk-inhabiting *Eupagurus bernhardus* of Europe is also found on the northeastern coast of North America. A bristle-footed worm often lives in its shell and occasionally protrudes its head and snatches bits of food away from its landlord. Species of much larger size inhabit the tropics, and some are found far away from water in the driest of places. Such is the Diogenes crab (*Cenobita diogenes*), which, when it outgrows shells, takes to coconuts and feeds on the young of sea birds as well as small prey. The palm, or robber, crabs (*Birgus latro*) of the East Indies, being over a foot in length, are too large to find suitable shells or nuts for shelter and, although showing certain signs of ancestral shell life, yet have begun to redevelop a hard dermal protection. These large crabs live in burrows and climb coconut palms for the fruit upon which they feed. All these dry-land crabs, however, visit the water for the purpose of laying eggs.

Many deep-sea forms are symmetrical in claw and abdomen, unlike those which dwell in spiral shells. *Polycheles agassizii*, of the West Indies, manufactures for itself straight, compact tubes of sand, while *Xylopagurus rectus* lives in open tubes of bamboo or mangrove root. *Tylaspis anomala* has been dredged in the South Pacific from a depth of 2375 fathoms. It has a generalized, symmetrical abdomen and distinct segments and legs. Another symmetrical form (*Chaenopagurus*) allows itself to become inwrapped in a living blanket formed of the cœnosarc of a colony of polyps. Other crabs become similarly enveloped by living sponges. The claws of hermit crabs have been found in the Eocene rocks of Hungary.

Bibliography. Verrill, *Invertebrates of Vine-*

yard Sound (Washington, 1874); Emerton, *Life on the Seashore* (Salem, 1880); Edwards and Bouvier, "Description des crustacés de la famille des Paguriens pendant l'Expédition de la Blake," in *Memoirs of Comparative Zoology* (Cambridge, 1893); Arnold, *Sea Beach at Ebb Tide* (New York, 1901); Calman, "Crustacea," vii, in Lankester's *Treatise on Zoology* (London, 1909); Smith, "Crustacea," iv, in *Cambridge Natural History* (ib., 1909); Calman, *The Life of Crustacea* (New York, 1911); Lowe, *A Naturalist on Desert Islands* (London, 1911). See Plate of CRABS; COCONUT CRAB.

HERMITE, ār'mêt', CHARLES (1822-1901). One of the best-known French mathematicians of the nineteenth century. He was born at Dieuze, Meurthe, and received his early education in the Lycée Louis-le-Grand. He entered the Ecole Polytechnique in 1842, but left at the end of the year, in order to devote his attention exclusively to mathematics. From 1848 to 1876 he was connected with the Ecole Polytechnique in various capacities, and from 1862 to 1873 was maître de conférences in the Ecole Normale Supérieure. From 1876 until his death he gave his time to the university, where he held the chair of higher algebra (1869-97). He was a member of the Academy of Sciences and a Grand Officer of the Legion of Honor (1892). His work was chiefly along the line of theory of functions, in which subject he was for many years the leader in France. His first great work, the one which secured for him his election to the Academy of Sciences, was *Sur la théorie de la transformation des fonctions abéliennes* (*Comptes Rendus*, 1856). At about the same time he began his discoveries in the new theory of algebraic forms and in the theory of numbers. His most remarkable memoirs, 26 in number, *Sur quelques applications de la théorie des fonctions elliptiques*, appeared in the *Comptes Rendus* (1877-82). His memoir, *Sur l'équation du 5ème degré* (1866), may be said to have finally settled the great question of the solubility of the quintic equation to the entire satisfaction of the mathematical world. His memoir *Sur la fonction exponentielle* (1874), in which he proved the incommensurability of e , paved the way for Lindemann's proof (1882) of the incommensurability of π . Hermite was a very prolific writer. A substantially complete list of his memoirs may be found in the *Catalogue of Scientific Papers of the Royal Society of London*, vols. iii and vii. Besides his memoirs, which contain his most valuable contributions, he published a *Cours d'analyse de l'Ecole Polytechnique* (1873; 2d ed., 1894) and assisted Serret in editing Lacroix's calculus (2 vols., 9th ed., Paris, 1881). Consult articles by Mittag-Leffler and Picard in *Acta Mathematica*, vols. xxiii, xxiv (Stockholm, 1901-02); *Memoirs and Proceedings of the Manchester Literary and Philosophical Society* for 1901; Gaston Darboux, *Notice historique sur Charles Hermite* (Paris, 1905).

HERMIT HUMMING BIRD. A name given to a group of humming birds which agree in having the beaks much curved and the edge of the mandibles not serrated. The "true" hermits are of the genus *Phaethornis*, whose 40 or 50 species are found from Mexico to southern Brazil, mostly in the hot lowlands. The "sickle-billed" hermits of the genus *Eutoxeres* have the beak greatly bent downward, sometimes describing a full half circle. The whole group are

dull green, gray, or brown in color and keep themselves secluded in dense woods. See HUMMING BIRD.

HERMIT KINGDOM. A popular name formerly given to Korea (q.v.) because of its exclusiveness.

HERMIT THRUSH. See THRUSH.

HERMOCRATES (Lat., from Gk. Ἑρμοκράτης, *Hermokratēs*) (c.460-407 B.C.). A Syracusan politician and statesman, son of Hermon. His great work was the union of the Siceliots (424), which made possible the successful defense of Syracuse (q.v.) when that city was attacked by the great fleet from Athens (415). He was at the head of the aristocratic party and was opposed by the demagogue Athenagoras. In 412 B.C. he went with a large Syracusan fleet to join the Spartans off the western coast of Asia Minor. Here he was very successful for a time, but lost the battle of Cyzicus and for this was removed from command and exiled. He then fought against Carthage and died in his attempt to reinstate himself in Syracuse. His daughter was married to Dionysius in 405. See "Hermokrates, 1," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HERMODACTYL (from Gk. ἑρμόδακτυλος, *hermodaktylos*, *hermodactyl*, from Ἑρμῆς, *Hermēs*, Hermes + δάκτυλος, *daktylos*, finger). The name given to bulbs and roots of an uncertain plant growing east of the Mediterranean, held in high repute among the Greek and the Arabian physicians as a remedy for gout and rheumatism. By some botanists, e.g., Fée, it is thought to be a colchicum; by others, *Iris tuberosa*. As found at the chemist shops, the roots resemble *Colchicum autumnale*, but on analysis yield neither veratrine nor colchicine. The authors of the dispensatory doubt it being the hermodactyl of history. It is mentioned by Alexander of Tralles, who flourished 560 A.D.; by Paulus Aegineta, who lived a century later; by Avicenna, Serapion, and others. By some of the old writers it was termed *anima articulorum*, or the soul of the joints. Corms, probably of several species of colchicum, are still sold in Greece and in the East under the name of hermodactyls. See COLCHICUM.

HERMOGENES, hēr-mōj'ē-nēz (Lat., from Gk. Ἑρμογένης). A Greek rhetorician, who flourished about 170 A.D., born at Tarsus. His ability as a lecturer won him the favorable notice of the Emperor Marcus Aurelius, who appointed him, when he was only 17 years of age, a public teacher of oratory. Between the ages of 18 and 20 he published his famous *Manual of Rhetoric* (Τέχνη Ῥητορική), which was for centuries regarded as a standard and became the subject of extensive commentaries. At the age of 25 his faculties gave way, and he spent the remainder of his life in a state of intellectual impotency. A large part of the *Rhetoric*, dealing with the "invention" of arguments, the kinds of style, on effective speaking, etc., has survived, and was published by Walz, *Rhetores Græci* (Stuttgart, 1832-36), and by Spengel, *Rhetores Græci* (Leipzig, 1853-56). Consult Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed., Munich, 1913).

HERMON. A lofty mountain of Syria, the southern end of the Anti-Lebanon Range, from which it is separated, however, by a deep ravine (Map: Palestine, D 1). It rises to the height of 9166 feet above the level of the sea. Its

crown is divided into three distinct peaks—the western one a little lower than the northern and the southern, which are of the same height. These peaks are always covered with ice and snow and can be seen as far south as the Sea of Galilee. The lower part of the mountain is clothed with forests and a specially rich vegetation, due to the numerous rivulets caused by the melting snow. Hermon was a sacred mountain and is therefore encircled with ruins of ancient temples, most of which were consecrated to the Baal worship. It is often referred to in Hebrew poetry. It is also held by tradition to have been the Mount of Transfiguration. It is now called Jebel-el-Sheikh (the mountain of the old man), or Jebel-el-Thel (the snow mountain).

HERMONTIS (Lat., from Gk. *Ἡρωνθίς*). A city of ancient Egypt on the left bank of the Nile, a little above Thebes. Its Egyptian name was On, and, to distinguish it from other places of the same name, it was called On of the South or On of the god Mont. The local deity was the hawk-headed god Mont (q.v.), and hence the city bore the sacred name of *Per-Mont* (house of Mont), of which the Greek *Hermonthis* is a corruption. It was a very ancient town, but was eclipsed by the rise of its neighbor Thebes. With the decline of Thebes On rose again in importance, and finally, as Hermonthis, became the capital of the district. According to Strabo, Apollo (i.e., Horus) and Zeus (i.e., Mont) were worshiped here, and a sacred bull, called by the Greeks Bacis, was also revered. Of the magnificent buildings which adorned the place in ancient times only scanty ruins now remain. The site is occupied by the modern town of Erment, which contains extensive sugar refineries.

HERMOPOLIS, or **HERMU'POLIS** (Gk. *Ἡρμόπολις*, city of Hermes). The capital of the Greek Nomarchy of the Cyclades, situated on the east coast of the island of Syra (Map: Greece, E 6). It consists of the old mediæval town and the newer portion constructed since the revolution of 1821 on the site of the ancient Syros. The town is lighted by gas and has a number of churches, two Gymnasias, a marine and trade school, a theological seminary, and a theatre. The chief industry is shipbuilding, and there are manufactures of textiles, leather, and glass. Commercially Hermopolis, with its modern docks and wharves, is one of the most important cities of Greece, being one of the chief centres in the trade with the Levant. It exports tobacco and emery. Hermopolis is the seat of a number of consular agents, of a Greek archbishop and a Roman Catholic bishop. Pop., 1896, 18,760; 1907, 17,773.

HERMOPOLIS, or **HERMU'POLIS MAGNA**. An ancient city of middle Egypt, on the left bank of the Nile, between the river and the Bahr-Yūsuf (Joseph's canal), opposite Antinoë, not far south of the site of the modern Beni-Hassan (q.v.). The Copts called it Shmūn and the hieroglyphics Khmunu. The village which is on its site bears the name "Ashmunein." The Greek name "Hermopolis" is derived from the ibis-formed or ibis-headed local god Thoth, or Dhouti, who was identified with the Greek Hermes. The city was once very important; but the only remarkable ruin, the portico of a beautiful temple, dating from Ptolemaic times, was destroyed in the middle of the last century. Recently another temple has been discovered there. Another Hermopolis, Hermopolis Parva, is the modern Damanhur in the Delta.

HERMOSILLO, ár'mó-sē'lyó. Capital of the State of Sonora, Mexico, situated on the Río de Sonora, in a fertile valley 90 miles by rail north from Guaymas (Map: Mexico, C 3). It has a cathedral, a library, and a mint, and is an important trading centre. It exports ores, hides, and fruit, mostly to the United States, and is the seat of a United States Consul. Pop., 14,574.

HERNÁNDEZ. See **FERNÁNDEZ**.

HERNÁNDEZ, ěr-nān'dáth, José CONRADO (1849-). A Porto-Rican jurist. He was born at Aibonito, Porto Rico, and graduated from the Jesuits' College at San Juan, Porto Rico, in 1865, and from the law department of the University of Salamanca, Spain, in 1873. From 1877 to 1891 he served as an assistant prosecuting attorney and judge in Porto Rico and Cuba; he then went to the Philippine Islands, where he was judge of the Supreme Court of Cebu (1891-93) and of Manila (1894-98) and prosecuting attorney of Vigan, Luzon (1893-94). In 1898 he returned to Porto Rico as judge of the Circuit Court at San Juan, and he was afterward associate justice of the Supreme Court (1899-1909) and then Chief Justice.

HERNANI, OU L'HONNEUR CASTILLAN, ár'ná'nē, ōō ló'nēr' ká'stē'yūn' (Fr., Hernani, or Castilian honor). A romantic five-act tragedy in verse, by Victor Hugo. See **ERNANI**.

HERNDON, ĥēr'n'don, WILLIAM HENRY (1818-91). An American lawyer, born in Greensburg, Ky. When he was two years old, his parents removed to Illinois. In 1836 he entered Illinois College, but was removed by his father in consequence of the abolition sentiments of the faculty. He studied law, and was admitted to the bar in 1844, when he formed a partnership with Abraham Lincoln, which was continued formally until the latter's death. In 1855 he was mayor of Springfield, Ill. In connection with Jesse W. Weik, who assisted in putting into literary form the material he (Herndon) had collected, he published *Herndon's Lincoln: The True Story of a Great Life* (2 vols., New York, 1901), which is of especial value for the account it gives of Lincoln's early life and personal habits.

HERNE, ĥēr'ne. A town of Westphalia, Prussia, Germany, 11 miles northeast of Essen by rail. It is the centre of the great coal industry of the Ruhr and manufactures machinery, boilers, fire brick, and gunpowder. It was incorporated in 1897 and has a Gymnasium and a school of mines. Pop., 1900, 27,863; 1910, 57,167.

HERNE, ĥēr'n, JAMES A. (1840-1901). An American actor and playwright. He was born at Cohoes, N. Y., of Irish parentage. He ran away from home at the age of 20 and joined a theatrical company in Troy, where he made his first professional appearance in *Uncle Tom's Cabin*. Afterward he played in Baltimore and Washington and then went to California. He had become a popular actor, both East and West, before he produced his first play, *Hearts of Oak*, in 1878. This was very successful; but his subsequent productions, such as *Drifting Apart* and *Margaret Fleming*, were less fortunate, till in the season of 1892-93 his *Shore Acres* at the Boston Museum made its author famous. It is a rural comedy in which he, as "Uncle Nat" Berry, presented a character full of honest humor and touching pathos, and the play kept the boards almost without a break for six years.

In 1899 he produced *The Rev. Griffith Davenport* and the following year *Sag Harbor*. Consult L. C. Strang, *Famous Actors of the Day in America* (Boston, 1900), and M. J. Moses, *The American Dramatist* (ib., 1911).

HERNE THE HUNTER. A character in popular tradition, who, it was believed, walked at midnight by an ancient oak in Windsor Forest. In Shakespeare's *Merry Wives of Windsor* (iv, 4) he is described as a spirit, with huge horns on his head, who disturbs the revels of the fairies. He also plays a part in Harrison Ainsworth's romance entitled *Windsor Castle*. Herne's oak, said to have been 650 years old, was blown down in 1863. A young oak was planted on the spot by Queen Victoria.

HERNIA. (Lat.) An abnormal protrusion of the whole or a part of an organ of the body from its natural cavity. This may occur through openings already existing or produced accidentally. There may be hernia of the brain, lungs, or any of the abdominal viscera, especially the intestines; the latter being commonly spoken of as *rupture*. This condition should be called by the proper name "hernia" rather than by the old term given when it was supposed to be due to a tear of tissues. The abdominal organs are frequently subjected to great pressure, as in the crying of infants, straining at stool, lifting of heavy weights, or violent attacks of coughing of adults. The unusual strain causes the freely movable intestine to seek escape at the point of least resistance, which is usually at one of the openings at the lower anterior part of the abdomen. The name of the opening determines the name of the hernia—as inguinal if in the inguinal canal, femoral if with the femoral artery in the crural ring, umbilical if the escape is at the navel. (See **UMBILICAL HERNIA**.) In rare instances the protrusion may be in the median line above or below the umbilicus and is then termed a ventral hernia. Hernia sometimes occurs at or near the wound following operations involving the abdominal wall.

Hernia is most frequent at the extremes of life, being found in 2 per cent of individuals one year old and nearly 2½ per cent in those 75 years old. At the time of the War of the Rebellion in the United States, of half a million men examined, 31 per thousand were rejected because of hernia. Women are subject to this affection in about one-fourth the proportion of men, except as to the femoral and umbilical forms, to which they are peculiarly liable. In some boys hernia is congenital, owing to the nonclosure of the tube of peritoneum that accompanies the testicle out from the abdomen and normally shrinks to become the tunica vaginalis.

A hernia consists of (1) a sac, (2) its contents, and (3) its coverings. The sac is a portion of peritoneum pushed before the hernial body. It usually contains a small amount of fluid. The contents is in most cases a loop of the ileum, or small intestine, and constitutes the variety called enterocoele. Should the sac contain only omentum, it is called epiplocele; if both intestine and omentum, it is termed entero-epiplocele. The appendix is occasionally found in the hernial sac. The coverings of hernia vary with its character, but in general are the skin, superficial fascia, muscular layers, deep fascia, and peritoneum.

Hernia is classified as to condition by the

terms "reducible," "irreducible," and "strangulated." A reducible hernia is one that by gentle manipulation, called taxis, can be returned into the abdominal cavity. When irreducible, it cannot be replaced. The irreducible may suddenly become strangulated by the accumulation of intestine in such amount as to cause interference with the blood supply. Congestion then results, followed by inflammation, then by gangrene unless the condition be relieved by prompt operation, which is cutting the rigid ring that pinches the gut.

Treatment of hernia depends upon its character and the age of the patient as well as duration of the lesion. In the young it is usual to apply a truss, sometimes of soft material, but more often of steel surrounding the body and terminating in a pad that will press over the abdominal ring, thus preventing escape of the tumor. Umbilical hernia of infants is often cured by a pad made from hard rubber or a button mould or a silver coin secured by a band of adhesive plaster around the abdomen. Such an apparatus must be worn for two or three years. Trusses may be removed at night, but should be adjusted carefully in the morning, while the patient is still lying on his back, so that gravity will aid in reducing the tumor. The person with hernia should keep free from constipation and avoid severe exercise, especially jumping or heavy lifting. In case the tumor is excessively large, a truss will not retain it; and should the patient be too old for an operation, he may have to carry the hernia in a support resting upon the hips or even suspended from the shoulders.

From very early times surgeons had been devising operations that would partly close the abdominal ring and the inguinal canal, but they all failed to prevent a recurrence of the hernia. It remained for Bassini, of Padua, to publish in 1890 the details of a method which has revolutionized the course of hernias. The operation consists in removing all abnormal contents and constructing a new canal by laying the spermatic cord against the muscle and securing each layer of the sac by itself, either with silk or with kangaroo tendon. The operation is done under thorough antiseptic conditions and with practical assurance of success. The gentleman is relieved of discomfort, the laborer enabled to return to hard work. Coley and Bull have reported 1500 operations on children with but five relapses and four deaths. Consult J. G. Mumford, *Practice of Surgery* (2d ed., Philadelphia, 1914); W. B. DeGarmo, *Abdominal Hernia* (Philadelphia, 1907).

HERNICI, hēr-ně-chē. An old Italian people of Latium (q.v.). Of Sabine connection, they dwelt in the Apennines between the Trerus and the Lacus Fucinus. They held out long against the Romans, with whom they at length formed an equal alliance in 486 B.C., but to whom they had to yield in 306 B.C. Before 225 B.C., probably, they received the rights of Roman citizens. To the north were the Marsi and the Æqui, while the Volsci were on the south. Their capital was Anagnia, now called Anagni (q.v.). Consult Conway, *Italic Dialects* (Cambridge, 1907).

HERNÖSAND, hēr-ně-sänd. An episcopal town, the capital of the Län of Västernorrland, Sweden, situated on the island of Hernön, in the Gulf of Bothnia, about 2 miles south of the mouth of the Angerman River (Map: Sweden,

F 5). It is connected by bridges with the mainland. It has a cathedral, a school of navigation, a classical academy, a technical school, and a teachers' institute. Its harbor is good, it has regular steamship communication with other coast towns, and it carries on a thriving trade in tobacco, lumber, and fish. It was founded in 1584 by John III, became a bishop's see in 1772, and capital of the län in 1778. Pop., 1901, 8069; 1911, 9785.

HERO (Lat., from Gk. Ἡρώ). A priestess of Aphrodite at Sestos. At a festival of Aphrodite she was seen and loved by Leander, a youth of Abydos (q.v.). She returned his love, and, since she was a priestess, received him secretly in her tower on the Hellespont, which he swam nightly, guided by her lamp. Venturing the passage on a stormy night when the tempest blew out the beacon, he was drowned. His body was washed ashore at the tower, whence Hero at once cast herself that she might be united with her lover in death. The story developed in the romantic poetry of the Alexandrian period and has come down to us in a work of Musæus (q.v.) and in Ovid (*Heroides*, xviii, xix). It is represented on some late works of art and on Roman coins of Abydos and Sestos. It is also the subject of poems by Marlowe, G. Chapman, and Schiller, and of a drama, *Des Meeres und der Liebe Wellen*, by Grillparzer. Consult Köppner, *Die Sage von Hero und Leander in der Literatur und Kunst des Altertums* (1894); Knaack, "Hero und Leander," in *Festgabe für Franz Susemihl* (1898); C. M. Gayley, *The Classic Myths in English Literature and in Art* (2d ed., Boston, 1911).

HERO. See **HEROES**.

HERO. A Greek mathematician and physicist. See **HERO**, or **HERON**, OF **ALEXANDRIA**.

HERO. The daughter of Leonato and cousin of the gay Beatrice in Shakespeare's *Much Ado About Nothing*.

HERO AND LEANDER. See **HERO**.

HEROD, hēr'od (Gk. Ἡρώδης, *Hērōdēs*). The family name of a group of rulers in Palestine, derived from that of its most famous member, Herod the Great. The family had its origin in Antipas, or Antipater, an Idumæan of honorable stock, whom Alexander Jannæus (102-76 B.C.) made governor of Idumæa. The fact that the Idumæans had been subjected to John Hyrcanus in 128 B.C. and compelled to embrace Judaism is the only basis for the claim that the members of the Herodian line were Jews. In his power and influence, and apparently in his official position in Idumæa, Antipater was succeeded by his son of the same name. The latter, with the sagacity which had become characteristic of the family, made the declining fortunes of the Hasmonæan rule and the rising fortunes of Rome serve his political interests until the real control of the country of the Jews rested in his hand—a control which he strengthened by appointing his two sons, Phasael and Herod, governors respectively in Jerusalem and in Galilee.

1. **HEROD THE GREAT**. Son of Antipater and Cypros, an Arabian woman; reigned from 37 to 4 B.C. Upon the assassination of Antipater (43 B.C.) there followed a period of intrigue and warfare on the part of the Hasmonæan Antigonus and the Parthians against the Herodian rule, which resulted in the death of Phasael and the escape of Herod to Rome. There in 39 B.C. he was made King of Judæa by Antony, Octavius, and the Senate. It was not, however, until

37 B.C. that he succeeded in putting down the forces opposing him. The first years of his reign (37-25 B.C.) were troublous, owing to the hostility of the Sadducean and Pharisaic parties, and the enmity of the surviving members of the Hasmonæan house, who secured an ally in Cleopatra of Egypt. Herod ultimately prevailed, partly through murder and confiscation of property, partly through political cleverness and trickery, but mainly through the fall of Antony and Cleopatra before the forces of Octavius. After the battle of Actium (31 B.C.) his title was confirmed by Octavius at Rhodes, and he sought to establish his power at home by the execution of Hyocanus and suppression of the Hasmonæans. It was jealousy, however, and no political motive, that caused the execution of Mariamne, his wife, whom he passionately loved. The years from 25 to 13 B.C. were in the main prosperous. Herod was free to rule and to indulge his passion for building, the results of which showed themselves in the rehabilitation of such places as Strato's Fortress, and such cities as Samaria, Capharsaba, and Anthe-don, renamed by him respectively Cæsarea Palestinæ (q.v.), Sebaste, Antipatris, and Agrippæum. At Jerusalem, Jericho, and Cæsarea he erected theatres, amphitheatres, and hippodromes for the Grecian games established in honor of Augustus. He built and rebuilt fortresses such as Alexandrium, Herodium, Hyrcanium, Masada, and others. He rebuilt the temple in Jerusalem with the most lavish expenditure of wealth and careful regard for the religious scruples of the people. This munificence was extended even beyond his domains to cities in Syria, Asia Minor, and Greece. Herod also gratified his Hellenizing tastes by inviting and attaching to his court Greek writers and teachers. With all this he was loyal to the people over whom he ruled, not only bestowing upon them substantial benefits at home, but securing for them large favors in some parts of the Diaspora and significant privileges from Rome. The last years of his reign (13-4 B.C.) were full of misery, occasioned by the ceaseless and complicated political intrigues within his household, which rendered him morbidly suspicious and inflamed his murderous passions to the worst. The enthusiasm shown by the people for his sons by Mariamne, who on their mother's side belonged to the Hasmonæan line, aroused his suspicion and led to their assassination at Sebaste; and his eldest son Antipater was put to death a few days before Herod himself died. It is generally held by scholars that Jesus of Nazareth was born towards the end of Herod's reign—some preferring a date immediately before his death, others assigning various dates from 10 to 6 B.C. Many modern scholars regard the account of Herod's murder of the children in Bethlehem, which is not referred to by any secular writer, as unhistorical. On his last visit to Rome Herod obtained consent of Augustus to dispose of his kingdom as he saw fit. A few hours before his death he made a will, in which he gave Judæa, including Samaria and Idumæa, to Archelaus, with the title of king; Galilee and Perea to Antipas, with the title of tetrarch; and Gaulanitis, Auranitis, Trachonitis, Batanea, and Panias to Philip, with the title of tetrarch. This will was practically confirmed by Augustus, and in spite of disturbances and disorders on the part of the people, who desired to be rid of the Herodian

yoke, was ultimately put into effect. Consult: Chijs, *De Herode Magno Judæorum Rege* (Leyden, 1855); De Sauley, *Histoire d'Hérode, roi des Juifs* (Paris, 1867); Schürer, *Geschichte des jüdischen Volkes* (4th ed., Leipzig, 1901-09); Schmidt, "Alexandrium," in *Journal of Biblical Literature* (Boston, 1910); Otto, *Herodes; Beiträge zur Geschichte des letzten jüdischen Königshauses* (Stuttgart, 1913); Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914).

2. **ARCHELAUS**, ethnarch of Judæa, Idumæa, and Samaria. Son of Herod the Great and Malthace, a Samaritan woman; ruled from 4 B.C. to 6 A.D. Though given title of king by his father's will, Augustus withheld this from him, substituting that of ethnarch. He was the worst of Herod's surviving sons. Of his reign we have no details, but Josephus describes it as violent and tyrannical. After nine years the Jews made such complaints against Archelaus that Augustus banished him to Vienne in Gaul. Archelaus is referred to in Matt. ii. 22, as "reigning over Judæa in the room of his father Herod."—3. **ANTIPAS** (Herod Antipas), tetrarch of Galilee. Son of Herod the Great and the Samaritan Malthace, younger brother of Archelaus; ruled from 4 B.C. to 39 A.D. Though not much is known of his rule, he seems to have been able to govern his country and to have possessed the family passion for building. In Galilee he remade Sepphoris, afterward called Dio-Cæsarea, and in Peræa, Betharamphtha, which he named Livias after the wife of Augustus, and in addition reared the magnificent capital which he named Tiberias, for the reigning Emperor. He seems to have had his father's craftiness, though he apparently lacked his diplomacy, as he certainly did his ability in war. The discarding of his first wife, daughter of the Nabatean King Aretas, for Herodias, wife of his half brother Herod Philip (Mark vi. 17; Matt. xiv. 3), not the tetrarch Philip, brought on a war with Aretas in which Antipas was routed. Later, through the persuasion of Herodias, he went to Rome and demanded of Caligula that he be favored, as Agrippa I had just been, with the title of king. He was confronted, however, by charges from Agrippa himself, was deposed, and banished by the Emperor to Lugdunum (Lyons) in Gaul. This Antipas is the "Herod" most frequently mentioned in the New Testament (Matt. xiv. 1; Luke iii. 1, xiii. 31; Acts xiii. 1 et al.). It was he who imprisoned and beheaded John the Baptist (Mark vi. 14-29, where he is wrongly called "King"). He was designated as a "fox" by Jesus (Luke xiii. 32), and it was to him that Jesus was sent by Pilate (Luke xxiii. 7-15).—4. **PHILIP**. Son of Herod the Great and Cleopatra, a woman of Jerusalem; ruled from 4 B.C. to 34 A.D. The country over which he ruled as tetrarch was Ituræa, north and east of the Sea of Galilee, consequently outside of strictly Jewish territory and inhabited by a predominantly non-Jewish population. It was owing to this fact that Philip was able to carry out a Hellenizing and Roman policy among his people. He had the family passion for building and founded on the site of Paneas a city which he named Cæsarea, known as Cæsarea Philippi (q.v.), to distinguish it from the larger city on the coast. He also rebuilt Bethsaida, which he called Julias, in honor of the daughter of Augustus. Of his rule nothing is known beyond what may be inferred from

Josephus' characterization of the man, as "a person of moderation and quietness" in the conduct of his life and government. He seems to have possessed none of the Herodian ambition, cruelty, or lust. He was married to Salome, the daughter of Herodias, and died without issue.—5. **AGRIPPA** (Herod Agrippa). Son of Aristobulus, Herod the Great's son by Mariamne, granddaughter of Hyrcanus, and Berenice, daughter of Salome, Herod's sister, and Castobar; ruled from 37 to 44 A.D. His earlier years were spent in Rome, where he fell into spendthrift habits that finally compelled his retirement to Palestine. In the last years of Tiberius' reign he returned to Rome and succeeded in securing the appointment by the Emperor to the care of his grandson. He had been friendly with Caligula in his early life and shortly after the latter's accession received from him the tetrarchies of Philip and Lysanias (viz., Abilene) with the title of king, while the Senate added the honorary rank of prætor. In 40 A.D. he obtained the fortified tetrarchy of Antipas; and in the next year, when Claudius came to the throne, he was given by the Emperor, along with the honor of the consular rank, the additional territory of Judæa and Samaria, thus finally securing the whole region over which his grandfather had ruled. The next three years constitute the real period of his rule. For the sake of peace he followed a pro-Jewish policy, which showed itself in a personal piety of almost Pharisaic legalism and an official furtherance of the interests of the Jews, which brought them to regard him as a brother and alienated from him the regard of the Roman element in his population and of the Roman troops in his domains. This Jewish favoritism, no doubt, was the cause of his persecution of the Christians (Acts xii. 1-19). The account of his death given by Josephus (*Antiq.*, xix, 8, 2) is in substantial agreement with that in Acts xiii. 20-23.—6. **AGRIPPA II** (Herod Agrippa). Son of Agrippa I and Cypros; ruled from 50 to about 100 A.D. Because of his extreme youth at the time of his father's death, Claudius was persuaded not to give him the succession. The whole of Palestine thus passed under direct Roman rule. In 50 A.D., however, two years after the death of his uncle Herod of Chalcis, he received the kingdom which had thus been vacated. This he surrendered in 53 A.D., receiving in return the former tetrarchy of Philip, together with that of Lysanias and the domains of Varus. In 56 A.D. Nero added to this the cities of Tiberias and Julias in Galilee and Tarichæa in Peræa, with surrounding lands and villages. Like all his family, he gave himself to building, improving his capital, Cæsarea Philippi, which he renamed Neronias, and architecturally adorning Berytus (Beirut) in Phœnicia. Unlike his father, he gave no special care to the interests of the Jews—manifesting, in fact, a general indifference to the religious questions of his time, though it was in his rule that the temple at Jerusalem was finished. He tried to combine Hellenism and Judaism and placed the effigies of the emperors on his coins. He strove to dissuade the Jews from their war with Rome and manifested his loyalty to the Emperor even after his Galilean cities had deserted him. In return for this, after the war his territory was extended northward, while in 75 A.D. he had conferred upon him the prætorian rank. He left no children; in fact, it is doubtful whether he ever married. As far as record can be obtained,

he died in the third year of Trajan's reign (100 A.D.). His rule was a feeble one. It was before this Agrippa and his sister Berenice that Paul was brought by Festus in Cæsarea, on the eve of his deportation to Rome, as narrated in Acts xxv. 13-xxvi. 32. For the later Herods, consult especially Schürer, *Geschichte der jüdischen Völker* (4th ed., Leipzig, 1901-09), and Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914).

HEROD AGRIPPA. See HEROD.

HERODAS. See HERONDAS.

HERODES ATTICUS. See ATTICUS HERODES.

HÉRODIADÉ, á'rô'dyâd'. An opera by Massenet (q.v.), first produced at Brussels, Dec. 19, 1881; in the United States, Nov. 8, 1909.

HERODIAN (Gk. Ἡρώδιανός, *Hērōdianos*). A Greek historian of the third century A.D. He was a Syrian by birth, but held office under the Roman government, so that he writes with a practical knowledge of the events which he describes. His history, in eight books, covers the years 180-238 A.D., i.e., from the death of Marcus Aurelius to the accession of Gordianus III, and so supplements that of Dio Cassius, which stops with the end of the reign of Alexander Severus. The work was highly valued by later historians, especially the *Scriptores Historiæ Augustæ* (see AUGUSTAN HISTORY), and Johannes Antiochenus, who take long passages from it and try to imitate its style. The history was first made known to the Western world in the translation of Politianus (1493). The first critical edition was published by Bekker (Berlin, 1826); the best is that of Mendelssohn (Leipzig, 1883). There is an English translation by Hart (London, 1749). Consult Peter, *Die geschichtliche Litteratur über die römische Kaiserzeit*, ii (Leipzig, 1897), and Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed., Munich, 1913).

HERODIANS (Gk. Ἡρώδιανοί, *Hērōdianoí*, adherents of Herod, from Ἡρώδης, *Hērōdēs*, Herod). A party among the Jews, twice mentioned in the New Testament and both times in connection with the Pharisees: (1) Mark iii. 6, on the occasion of Jesus' healing of the man with the withered hand in the Capernaum synagogue; (2) Mark xii. 13 (cf. Matt. xxii. 16), on the occasion of placing before Jesus the question about tribute to Cæsar. They were evidently not a religious sect, as the Pharisees and the Sadducees, nor the mere court and family followers of the Herods, but rather a political party, whose object was the reestablishment of the Herodian kingdom in the spirit of its traditional policy—the union of Judaism with Hellenism. (See HEROD.) Their connection with the Pharisees, consequently, was not due to any sympathy of ideas with them, but to the instinctive conviction that in the spiritual mission of Jesus lay a danger common to them both. They were not necessarily pro-Roman in their feelings; though, in the nature of things, they would be more kindly disposed to the spirit of the pagan government than to that of the old theocracy, as represented by the Pharisees. It is probable that they had more in common with the religiously indifferent Sadducees than with any other Jewish party. Upon such a supposition there may be some bearing in the significant interchange of "Sadducees" and "Herod" in Jesus' warnings to His disciples as given in the parallels, Mark viii. 15 and Matt. xvi. 6.

HERODIANUS. A Greek historian. See HERODIAN.

HERODIANUS, ÆLIUS. A Greek grammarian of the second half of the second century A.D., son of Apollonius Dyscolus. He was born at Alexandria, but afterward removed to Rome and there gained the favor of the Emperor Marcus Aurelius, to whom he dedicated his chief work, *Καθολικὴ Προσῳδία*, called also *Μεγάλη Προσῳδία*, an exhaustive treatise on prosody, syntax, and etymology, in about twenty books. Of this work we have several epitomes. Though he is highly praised by later grammarians, including Priscian, who calls him *maximus auctor artis grammaticæ*, still, of his treatises on grammar only one, which deals with peculiar or anomalous words, *Περὶ Μονόρουπος Λέξεως*, has been preserved complete. Fragments, however, of his other works have been preserved in the citations of other grammarians and have been edited by Lentz in his *Herodiani Technici Reliquiæ* (3 vols., Leipzig, 1867-70). Consult: Lehrs, *Herodiani Scripta Tria* (Königsberg, 1848); Hilgard, *Excerpta ex Libris Herodiani* (Leipzig, 1887); Stephen, *De Herodiani Technici Dialectologię* (Strassburg, 1889); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed. Munich, 1913).

HERODIAS, hê-rô'di-ās. Daughter of Aristobulus (second son of Herod the Great and Mariamne, granddaughter of Hyrcanus) and Berenice, daughter of Salome, Herod's sister. She was twice married—first to her half uncle Herod, called in the Gospels Philip (Mark vi 17; Matt. xiv. 3), the issue of which marriage was a daughter, Salome, who afterward became the wife of Philip, another half uncle of her mother. Doubtless, through the real attachment of love, Herodias left her husband for his half brother, Antipas—a marriage which, because of its illegality according to the Mosaic law, brought upon the latter the outspoken denunciation of John the Baptist and so led to that prophet's imprisonment and final execution (Mark vi. 17-20; Matt. xiv. 3-12). It was her daughter who danced before Antipas on the occasion of the festival and allured him to the reckless oath that gave Herodias the opportunity to accomplish the death of John. If the marginal reading, "his daughter Herodias," which is better attested should be substituted for the text, it would indicate that the maid was a namesake of her mother and a child of the present marriage. It is not likely, however, that Herodias would venture to assign Herod's own child to such a degrading task. The general conclusion of scholars is therefore most probable, that the maid was Salome, the daughter of Herodias and Aristobulus, who afterward married Philip, the tetrarch of Trachonitis, her maternal uncle, and, later Aristobulus, King of Chalcis. It was Herodias' ambition that led her to urge Antipas to his fatal journey to Rome for the securing of the royal title, though her loyal affection for him made her share his exile. See HEROD.

HERODOTUS (Lat., from Gk. Ἡρόδοτος) (c.484-c.424 B.C.). A Greek historian. He was the son of Lyxes and Rheo, or Dryo, and was born at Halicarnassus (q.v.), an originally Dorian colony in southwestern Asia Minor, at that time ruled by a Queen Artemisia under the sway of the Persians. (See ARTEMISIA, 1.) Herodotus was thus by birth a subject of Persia. His uncle Panyasis (q.v.), was an epic poet; it was perhaps through him that Herodotus acquired the

comprehensive acquaintance with early Greek literature—prose and poetry both, but especially poetry—which is so conspicuous in his writings. His family was a prominent one. His uncle Panyasis was put to death about the year 457 for conspiring against the tyrant Lygdamis. Herodotus went into exile and is said to have made his temporary home in the island of Samos, an ally of Athens and member of the Confederacy of Delos or the Athenian Empire. Between 467 and 464 he is believed to have traveled extensively on the shores of the Black Sea, in Thrace, Scythia, Asia Minor, and the Persian Empire, including Egypt. The precise extent, direction, and starting points of his travels are matters of inference from his writings and of controversy among scholars. He saw in Egypt the skulls lying on the field of a battle fought in 460. He visited Scythia before 454. His travels in Greece, and possibly in southern Italy, fall much later. By these travels Herodotus gained first-hand knowledge of practically all the regions of which he wrote in his history. When Halicarnassus rose against Lygdamis and joined the Athenian Empire, Herodotus, according to one tradition a leader in the uprising, returned and resumed his citizenship. He was, however, soon attracted to Athens, then, about 447, at the height of the age of Pericles, the centre and focus of Hellenic culture. There he gave "author's readings" from his unfinished histories and won the admiration of the greatest minds of Greece, the personal friendship of the poet Sophocles, and, so the story goes, the more substantial reward of 10 talents voted by the people. A well-invented story, discredited, however, on chronological grounds, relates that the boy Thucydides, present at one of these readings, burst into tears from stress of emulous emotion, and that the historian complimented the boy's father on this indication of a generous nature. In the year 444 Herodotus, with many other brilliant men, joined the colony which Pericles was founding at Thurii (q.v.) in southern Italy and became a citizen there. His subsequent life is a blank. It was probably devoted to the completion and the final publication of his history. An allusion to the Propylæa, or entrance to the Acropolis, is supposed to prove that he visited Athens so late as 430. Nothing in his histories implies that he survived the year 424. Tradition placed his death and tomb at Thurii.

Herodotus was called by Cicero the father of history. This means, if anything, that he was the first to compose an artistic and dramatically unified history, although there were historians before him, the so-called logographers (q.v.), or story-tellers, who continued in prose the work of the garrulous later epic. The only one explicitly named by Herodotus is Hecataeus, of Miletus (q.v.), who traveled in Egypt, is mentioned as a prominent adviser of the Ionians during the Ionic revolt, and is thought by some critics to have been the source of much matter that Herodotus gives out as his own. But Herodotus was the first to grasp firmly a great central international theme and to work up, in due and artistic subordination to it, a vast mass of legendary, local, antiquarian, geographical, and ethnological lore, derived partly from predecessors, but widely supplemented by his own travels and inquiry (the original meaning of *history*). This theme, covered by books vii–ix of the history, was the invasion of Greece by Xerxes (q.v.), of which his boyhood had perhaps caught the last echoes in

the tales told by his townsfolk of the wondrous exploits of Artemisia at Salamis. He apprehended it as the culmination of the eternal conflict between the East and the West which he conceived as beginning with the Trojan War, and of which we have not yet seen the end. It shaped itself to his imagination in a large, dramatic, and religiously edifying way. Its prologue is the evolution of the free states of Greece, and, in antithesis to them, the history and panorama of the barbarian world of ancient monarchies and outlying peoples (books i–vi). Its dramatic culmination is the overthrow of the myriads of Xerxes by the few thousand Greeks at Salamis, Plataea, and Mycale. Its moral is the lesson of the nemesis that waits upon *hybris*—upon the insolence of those who, drunk with power, forget the limits of mortality. "For God abases the mighty ones of earth and suffers none to think proud thoughts save Himself." There are many theories (none of them verifiable) of the order of composition of the different parts of the history, of the digressions in which it abounds, and of the retouches by which its allusions were brought down to date. But in the final result the general design is so clear, both to Herodotus and to the reader, that, despite the bewildering prodigality of anecdote, digression, retrospect, and description, we never lose our sense of a majestic architectural unity, or fail to feel that we are progressing steadily towards a predetermined goal. The nine books, named after the muses, into which later grammarians aptly divided the work, fall into natural groups of symmetry or antithesis when viewed in connection with the whole. The first three books deal with centuries of time and the vast barbarian world, thus: (i) The overthrow of the Lydian kingdom of Croesus (see *LYDIA*; *CRÆSUS*), and, in retrospect, the establishment of the Persian monarchy as the heir of the immemorial empires of the East. (ii) Egypt in retrospect and description in connection with the Persian Conquest. (iii) The consolidation of the Persian Empire under Cambyses and Darius. The last three books are concerned with 10, or, more strictly, three years of conflict on Greek soil: books vii, viii, and ix, marked respectively by the battles of Thermopylae, Salamis, and Plataea. The three intervening books at once link and divide the extremes and trace the progress of Persia and the interlacing of Greek and Persian interests to the point where the struggle became inevitable. Their themes are as follows: (iv) The campaigns of Persia, in Scythia and Libya, with vast geographical and ethnological digressions. (v) The subjugation of the north coast of the Aegean—Thrace and Macedon. The beginnings of revolt among the Ionic cities, with anecdotal digressions on Athens and Sparta that prepare us for the rôle to be assumed by those cities. (vi) The revolt of the Ionians aided by Athens and Eretria; its suppression; the avenging mission of Mardonius against Eretria and Athens; his defeat at Marathon. Books i–vi form thus, in effect, an introduction to the main theme of the history.

Herodotus, though an artistic, is not a critical historian. (See *GREEK LITERATURE, History*.) A critical history was possible in that age only to a Thucydides describing on the testimony of documents and eyewitnesses a contemporary war between Greeks. The Greeks of the generation of the Persian wars were too busy making his-

tory to write it, and the tradition of the great struggle was already transfigured by legend and local patriotism when Herodotus took it up. Nor could he deal scientifically with the dim legends and inextricably crossed traditions of the East which he gathered on the frontiers of the Greek and barbarian worlds. Fortunately he did not make the attempt. Ignorant of the languages, unable to decipher the records, if he had applied to the tales told him by dragomans, minor priests, commercial travelers, and Greek mercenaries either his own standards of credibility or ours, he would have deprived us not only of many a delightful story, but of much invaluable information. "It is my business to relate what is told me," he declares, "but I am under no obligation to believe it." He does not believe that the Phœnicians got the noonday sun on their right hand in circumnavigating Africa, but he tells us the story; and, wasting no time on vain critical discussions or pretentious philosophies of history, he contrives to tell us more fascinating stories and more interesting facts to the page than any other writer in the world. In view of this and his evident good faith, genial simplicity, and earnest piety, we may disregard the critics who impugn his honesty because his account of a crocodile would amuse a naturalist, and his description of Babylon would not satisfy a Baedeker.

The charm of his seemingly simple, artfully artless, naïve, Ionic style has been celebrated by all critics, ancient and modern. Andrew Lang's entertaining parody, in his *Letters to Dead Authors*, gives, by exaggeration, a good idea of it to the English reader. Macaulay's essay "On History" contains a picturesque rhetorical characterization.

Bibliography. De Quincey wrote on what he called the "Philosophy of Herodotus," and his essay on "Style" has a fine digression on Herodotus at Olympia. The chief English translation is the classical work of Rawlinson in four volumes, with elaborate notes and introduction (London, 1858-60, often reprinted). The translation of G. C. Macaulay (2 vols., London, 1890) is well spoken of. Stein's annotated German edition (Berlin, 1901 et seq.) is, on the whole, the best short commentary. Sayce, *Herodotus*, i-iii (London, 1883), deserves attention for his introduction, notes, and appendices, though his attempt to discredit Herodotus' reliability has found little support. Macan, *Herodotus*, iv, v, vi, with appendices (ib., 1895), vii, viii, ix (ib., 1908), is rich in historic criticism. So, too, is the commentary on the whole work by How and Wells (2 vols., Oxford, 1912). Hauvette, *Hérodote: historien des guerres médiques* (Paris, 1894), is an excellent monograph. The volume on Herodotus in *Blackwood's Ancient Classics* is readable. Consult also: Kirchhoff, *Ueber die Abfassungszeit des herodotischen Geschichtswerks* (Berlin, 1878); Bauer, *Herodots Biographie* (Vienna, 1878); Delbrück, *Perser und Burgunderkriege* (Berlin, 1887), important; Grundy, *The Great Persian War* (London, 1901); Wright, *A Short History of Greek Literature* (New York, 1907); Bury, *Ancient Greek Historians* (ib., 1909); Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. i (5th ed., Munich, 1908); and the article "Herodotos," in the *Supplement, Zweites Heft*, to Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft* (Stuttgart, 1913).

HEROES, hērōz (from Lat. *heros*, from Gk.

ἥρως, hērōs, hero). In the older portions of the Homeric poems the heroes are warriors; in the *Odyssey* the word has broadened and denotes any distinguished character of the stories of the past. Hesiod (q.v.) applies the term chiefly to those who fought before Troy and before Thebes; he thought of them as demigods. This meaning prevailed later, and the heroes became the semi-divine objects of worship. To such heroes the later noble families, or even whole communities, traced their origin, and it has been, in consequence, held that the original use of the word was to denote the souls of the blessed ancestors; in this view the worship of the heroes is a survival of a primitive ancestor worship. These "heroes" were commonly regarded as sprung from the union of a god and a mortal. Their cult ritual was like that of the gods, but naturally had closest resemblance to that of the ethnonic divinities. Their worship was widespread. It seems very clear that in the large majority of cases those worshiped in historic times as heroes were originally gods, who had been superseded by the growth of the great personal gods. These superseded gods were conceived of as living, after their degradation, mortal lives, and, after that life had ended in death, as elevated to the position of heroes. It was natural that eminent men, too, who had seemed to possess somewhat of the divine essence, should receive reverence as supernatural beings after death. Such are the cases of Brasidas, Themistocles, and in later times some of the founders of philosophical schools, as Epicurus. From this it seems to have been easy to worship the living, as in the case of Alexander and some of his successors, who were honored as "savior gods" (*θεοὶ σωτῆρες*; see **APOTHEOSIS**). In Thrace the conception of the heroized dead as heavenly horsemen is common, but the word "hero" has become the name of a mighty god, to whom dedications are frequent. For the best brief account of the growth and character of the hero worship in Greece, consult Furtwängler, *Sammlung Sabouroff*, vol. i (Berlin, 1883). Consult also: Wassner, *De Herorum apud Græcos Cultu* (Kiel, 1883); Deneken, in Roscher, *Lexikon der griechischen und römischen Mythologie* (Leipzig, 1886-90); Usener, *Götternamen* (Bonn, 1896); Stengel, *Die griechische Kultusaltertümer* (Munich, 1898); Rohde, *Psyche* (Freiburg, 1905).

HEROIC HEXAMETER. See **VERSIFICATION**, *Greek and Latin: Dactylic Rhythms*.

HEROIC STANZA. See **VERSIFICATION**, *Germanic and English*.

HEROIDES, hērō'i-dēz. An early work of Ovid, a collection of 20 fictitious love letters sent by noble women of the olden time to their estranged husbands or lovers. The theme in all is the same, but their romantic nature and dramatic setting have placed them among the most popular of Ovid's works. The last six of the epistles are believed to be the work of imitators.

HEROIN. An acetic ester of morphine, chemically known as diacetyl-morphine. It is a white, crystalline, neutral, slightly bitter powder. It is only slightly soluble in water, but freely so when a dilute acid is added. The use of the drug in medicine practically dates from 1898, and there is still a diversity of opinion as to its action and value. Its analgesic effect is inferior to that of morphine or codeine, but it may be used as a substitute when these are not well tolerated. It seems to be chiefly of value in

allaying cough. For the relief of dyspnea it is sometimes effectual, having given good results in cases due to asthma, cardiac dilatation, aneurism of the aorta, and uræmia. It has been claimed that heroin is to the respiratory system what digitalis is to the heart. The dose should always be small, and it should be used with the same caution as other derivatives of opium. A single dose of two and one-half grains has been followed by great exhaustion, trembling, diminished temperature, a thready pulse of 140, contraction of the pupil, and impaired vision. Recovery followed the administration of caffeine. Of late years, its use has been generally restricted to cases of irritating cough from tuberculosis or bronchitis. It is a habit-forming drug and it is therefore to be given with great caution.

HEROIN HABIT. See DRUG ADDICTIONS.

HÉROLD, á'róld', LOUIS JOSEPH FERDINAND (1791-1833). A French dramatic composer, born in Paris. Although his father was a musician, he discouraged his son's musical ambitions, and it was only after his father's death (1802) that the boy was able to follow his natural bent. In 1806 he entered the Paris Conservatory, winning first prize for piano playing in 1810, and the Prix de Rome in 1812 with his cantata *Mlle. de la Vallière*. After studying in Rome for three years he went to Naples, producing there, in 1815, his first opera, *La gioventù di Enrico Quinto*. His next three or four operas, given in Paris, were successful, but, owing to poor libretti, were followed by a series of failures which for a time discouraged the composer. In 1828 Hérold was elected a member of the Legion of Honor. His best works, *Marie* (1826), *Zampa* (1831), and *Le pré aux clercs* (1832), are compositions of genuine merit and still hold the boards in France and Germany. Consult B. Jouvin, *Hérold, sa vie et ses œuvres* (Paris, 1868), and A. Pougin, *Hérold* (ib., 1906).

HERON (OF. *hairon*, heron, Fr. *héron*, Prov. *aïgron*, heron, from OHG. *heigr*, heron, AS. *hi-gora*; connected with AS. *heagra*, OS. *hreiera*, MHG. *reiger*, Ger. *Reiher*, heron, Skt. *krakana*, *krakara*, partridge, and Lat. *crociro*, Gk. *κρίκευ*, *krixein*, to screech, Goth. *hrops*, cry, OHG. *hruom*, *ruom*, Ger. *Ruhm*, fame, AS. *hroo*, Eng. *rook*). A bird of the genus *Ardea* (and allied genera), of the family Ardeidae and suborder Herodii, or Ardeae. This family includes also bitterns and night herons. In it the bill is long, compressed, and sharp, the tail short, the legs and the toes long and slender, the wings long. Those peculiar patches of soft oily feathers called "powder-down" tracts are always present—three pairs in the true herons (one on the breast, one on the rump, and one under the thighs). In the herons—in which genus are included the species commonly designated egrets (see EGRET), which differ only in unimportant particulars of plumage—the bill is slender but strong, forming a compressed and lengthened cone; the plumage is beautiful, but seldom exhibits very gay colors, white, brown, black, and slate-color, finely blended, being generally predominant. Although the sexes usually are alike in color, few birds show greater variety of plumage than the herons, for the breeding plumage is much finer than that of the remainder of the year, and the young are usually very different from the adults. Furthermore, a number of species are dichromatic; i.e., some specimens show one type of coloration and other specimens another type, absolutely without regard to age, season, or sex. (See

DICHROMATISM IN BIRDS.) In the herons one of the color phases is generally pure white; the other phase is more or less colored and is always remarkably different. (For the use of the plumage of certain herons as an ornament of costume and in millinery, which has led to their extinction in some regions, see ALGRETTE.) The body is small in proportion to the length of the neck and limbs; the neck is long and, except in flight, is usually held curved. In flight the heron carries the neck curved back in the form of a letter S, with the head resting against the shoulders, while the long legs trail out in a straight line behind. Herons feed mostly on fish, frogs, and other aquatic animals, and may be seen, particularly very early in the morning and late in the evening, standing patiently motionless in some shallow water, at the margin of a lake or stream, or on the seashore, waiting till prey come within reach. In default of their ordinary food, however, herons sometimes prey on young birds, frogs, reptiles, and the smaller mammalia. They usually go forth singly in quest of prey, but are mostly gregarious in their nidification. The nests are usually built in trees, of coarse sticks with little lining. The eggs are three or four, in color blue or bluish green, without spots. See Colored Plate of EGGS OF WATER AND GAME BIRDS.

Hérons are widely distributed over the globe, but are especially abundant in the tropics and warm temperate zones. About 100 species are known, of which about a dozen occur in the United States.

The great blue heron (*Ardea herodias*) is about 4 feet in length from the point of the bill to the end of the tail, and nearly 6 feet across the wings. It is of a delicate gray color on the upper parts, except the quill feathers, which are black, and the tail, which is deep slate-color. This common heron generally builds its nest in a high tree, and many nests are sometimes to be seen in a single tree. In northern parts of the continent the heron is known only as a summer bird of passage, but it remains in the southern United States all the year. Its geographical range extends over most parts of the New World north of the equator. Herons were formerly in great esteem for the table, although now disregarded. The common heron (*Ardea cinerea*) of Europe is very similar to the great blue heron, but has the tibiae white instead of chestnut. It is famous as the game which was most eagerly sought in falconry. Other well-known American herons are the little green heron (*Butorides virescens*), which is only about 1½ feet long, the prevailing colors dark green and brown, abundant throughout the United States and a little beyond, both north and south; the night heron (*Nycticorax nycticorax naevius*), a mere subspecies of the European night heron, found throughout the United States and Canada. (See NIGHT HERON.) The American egret (*Herodias egretta*) and the snowy egret (*Egretta candidissima*) are southern species, always pure white, the former about 60 per cent larger than the latter. The reddish egret (*Dichromanassa rufescens*), the little blue heron (*Florida cœrulea*), and the great white heron (*Ardea occidentalis*) are all dichromatic; the last being the largest American heron, about 4½ feet long and 8 feet in extent. The largest-known species is the giant heron of Africa (*Ardea goliath*), which slightly exceeds these figures. Among other herons of

the Old World may be mentioned the following: the purple heron (*Ardea purpurea*), which is of large size, purplish-blue plumage, and wide distribution (see Colored Plate of WADERS); and the great white heron, or great egret (*Ardea alba*), which is most common in Turkey and eastward. It is an extremely beautiful bird, with perfectly white plumage, much of it loose and flowing. The little egret (*Ardea garzetta*) has also white flowing plumage. Consult: Sclater and Hudson, *Argentine Ornithology* (London, 1888); Newton, *Dictionary of Birds* (New York, 1896); Cooke, "The Distribution and Migration of North American Herons and their Allies," *Biological Survey Bulletin*, No. 45 (Washington, 1913); and American ornithologies.

HERON. See HERO OF ALEXANDRIA.

HERON, MATILDA (1830-77). An American actress. She was born near Londonderry in Ireland and was brought to the United States by her parents in childhood. She first appeared in Philadelphia in 1851 as Bianca in *Fazio*. Her chief parts were Camille in *La Dame aux Camélias* and Ulah in *De Soto*. She played in all the principal American cities and visited London in 1861. She was married to Robert Stoepel, a musician, in 1857, but was divorced in 1869. In the latter part of her life she taught elocution in New York City.

HERON'DAS, or HERO'DAS (Lat., from Gk. Ἡρόνδας, or Ἡρόδας). A Greek poet of the third century B.C., born, probably, in the island of Cos. Of his mimes or mimiambi (i.e., mimes in iambic verse), as they are sometimes called (see MIMÉ), nothing was known before 1890 except a few fragments. In that year, however, an Egyptian papyrus was found in the Fayum, which contains seven comparatively complete poems and parts of two others. These are all written in the metre called the choliambus, or lame iambic trimeter. (See VERSIFICATION, *Greek and Latin: Iambic Rhythms*.) Unlike the works of the earlier iambographers, such as Archilochus and Hipponax, the poems of Herondas are not personal in their satire. They may be described as genre pieces descriptive of certain phases of life in the early Alexandrian time, and as such they are extremely interesting. The realism of these pictures, located largely on the island of Cos, is very striking. In them the Alexandrian age lives again in all its hurry and flurry, all its outward brilliancy and spiritual poverty. The new pieces were first published by Kenyon, *Classical Texts from Papyri in the British Museum* (London, 1891). The latest editions are by Crusius, *Untersuchungen zu den Mimiamben des Herondas* (Leipzig, 1892; 4th ed., 1904), and by Nairn (Oxford, 1904). For an English verse translation, consult Sharpley, *A Realist of the Aegean* (London, 1906). Consult also Wright, *A Short History of Greek Literature* (New York, 1907), and Christ-Schmid, *Geschichte der griechischen Litteratur*, vol. ii (5th ed., Munich, 1913).

HERO, or HERON, OF ALEXANDRIA.

The leading Greek mathematician and physicist of his time. Not only are the dates of his birth and death unknown, but there is great uncertainty as to the century in which he lived. The most recent investigation of the evidence, by Schmidt (1899, work cited below, vol. i, p. ix), leads to the conclusion that he may have lived in the first century A.D.; but other writers, who, it must be said, have not considered the question so fully, have usually placed him in the first or

even the second century B.C. There is much confusion concerning the works of Hero of Alexandria, there having been no less than 18 Greek writers of this name. It is, however, fairly certain that he wrote at least 13 books on mathematics and physics. He seems to have been an Egyptian, and it is certain that his style is not that of a Greek. He contributed little to pure mathematics, his chief work on this subject being the extension of the ancient mathematics so as to allow the consideration of the fourth power of lines. Thus, in his geodesy (*γεωδαισica*) contained in his *Μερικά*, upon which subject he was the only Greek writer, he gives the well-known formula for finding the area of a triangle with sides, a, b, c ,

and semiperimeter s , $\sqrt{s(s-a)(s-b)(s-c)}$, a formula known by his name. (The proof is given, possibly an interpolation, in his *Περί δόπτρας*. He seems also to have had some idea of trigonometry, and in his geometry is to be found the first definite use of a trigonometric formula. He asserts in substance, using modern symbols, that if A represents the area of a regular n -gon of side s , and if c be the numerical coefficient by which s^2 must be multiplied to produce A , i.e., so that $A = cs^2$, then must $c = \frac{n}{4} \cot \frac{180^\circ}{n}$. He proceeds to compute c for the values $n = 3, 4, \dots, 12$, with considerable accuracy, but his method is unknown. He could also solve the complete quadratic equation $ax^2 + bx = c$, where a, b, c , are positive, but not the general form. Hero is credited with a number of mechanical inventions, including a contrivance for utilizing the force of steam and a fountain which bears his name. See *ÆOLIPILE*; *HERO'S FOUNTAIN*. Consult: Martin, "Recherches sur la vie et les ouvrages d'Héron d'Alexandrie," in vol. iv of *Mémoires présentées par divers savants à l'Académie d'Inscriptions* (1st series, Paris, 1854); Hultsch, *Heronis Alexandrini Geometricorum et Stereometricorum Reliquiæ* (Berlin, 1864); Schmidt, *Heronis Alexandrini Opera quæ Supersunt Omnia* (Leipzig, 1899); Hermann Schöne, *Vermessungslehre und Dioptra Griechisch und Deutsch* (ib., 1903).

HEROPHILUS (Lat., from Gk. Ἡρόφιλος) (flourished c.300 B.C.). A famous surgeon of antiquity, born at Chalcedon in Bithynia. He studied medicine under Praxagoras, one of the followers of Hippocrates, and afterward went to Alexandria in Egypt, where he became famous as a practitioner, and was one of the founders of the medical school in that city. His followers later spread to Pergamum, Laodicea, and elsewhere. Herophilus' greatest services were performed in the field of anatomy. He discovered the nerves and made important observations in connection with the eye. Several names which he gave to different parts of the body are still in use, one such, *torcular Herophili*, recording his own name. He is said to have practiced vivisection upon condemned criminals. His writings were numerous, but we have only fragments thereof. Consult "Herophilus, 4," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HERO'S FOUNTAIN (named from its inventor, Hero of Alexandria). A pneumatic apparatus, in which a vertical jet of water is produced by the pressure of condensed air. A simple form of the apparatus constructed of glass tubes is shown in the annexed figure. The

column of water in the left-hand tube compresses the air in the lower vessel; this causes an increase of pressure on the surface of the water in the upper cistern and causes it to gush out at the jet.



HERO'S
FOUNTAIN.

HEROSTRATUS (Lat., from Gk. Ἡρόστρατος). An Ephesian, whose name is mentioned in connection with the burning of a temple of Diana at Ephesus. (See **DIANA, TEMPLE OF**.) Herostratus expiated the deed by a painful death, and the Ephesians passed a decree that his name should never be mentioned. It was revealed by Theopompus.

HÉROULT, PAUL (c.1862-1914). A French metallurgist, born in Normandy. He was taken to England by his parents when he was four years old, but he was educated in Paris at the Ecole des Mines. In 1887 he patented a process for the manufacture of aluminium, and in the next year a factory was built to commercialize his process. Héroult was also the inventor of an electric furnace for making high-grade steel, which was adopted by British manufacturers and by the United States Steel Corporation.

See **IRON AND STEEL, METALLURGY OF, Electro-thermic Process**.

HERPES, hēr'pēs (Lat., from Gk. ἕρπης, *herpēs*, from ἔρπειν, *herpein*, Lat. *serpere*, Skt. *sarp*, to creep). A cutaneous eruption, characterized by spreading or creeping from place to place. The term was formerly applied to several different diseases, including eczema, psoriasis, lichen, and seborrhœa, as well as zona, to which it properly belongs. Zona, or herpes zoster, is a cutaneous disease of trophic origin, occurring as a sequence of various lesions of the nervous system. The disease is of an acute, inflammatory nature, characterized by a set of vesicles as large as a split pea, occurring in clusters and following the course of a peripheral nerve. The course of the affection is from 10 to 14 days in each locality to which it spreads, each irregular cluster of vesicles going through the process of increase, maturation, and decline, each vesicle drying into a scab. The inflamed areas are exquisitely tender to the touch, sometimes itching at the same time. Soothing and cooling applications should be made, avoiding ointments whose base is grease. Galvanism is of benefit. Appropriate internal treatment for the nerve condition must be employed. Herpes zoster is popularly called shingles, a corruption of *cingulum*.

Herpes simplex (fever blisters, cold sores) occurs on the lips as small vesicles on inflamed red bases, as the result of fever of any type, exposure to the wind, or nervous disturbances. It is occasionally seen in women at the menstrual period. It is probably a mild toxic neuritis of the delicate nerve filaments in this situation. Herpes simplex also occurs on the genitals, both of the male and female. Herpes sometimes attacks the eyelids, conjunctiva, and even the cornea of the eye.

HERPETOLOGY (from Gk. ἑρπετόν, *herpeton*, reptile, from ἔρπειν, *herpein*, to creep + *-λογία*, *-logia*, account, from *λέγειν*, *legein*, to

say). That branch of natural history which treats of reptiles and formerly included the amphibia. Now, however, the term is restricted to the Reptilia proper, which includes lizards, snakes, turtles, crocodiles, alligators, and various extinct aquatic and terrestrial reptiles. The first attempt at a systematic arrangement of reptiles was made by Ray (1693), but he did not clearly comprehend their relationships, nor did he give the group a name. Linnæus (1735-68) classed tortoises, lizards, and serpents as amphibia and recognized two subgroups, (1) those with and (2) those without feet. He included in this class those forms which we to-day call amphibia, and later he added branchiostegous fishes. Of course, such an arbitrary classification, without any morphological foundation, was soon replaced by others. Linnæus recognized 213 species and 10 genera. Cuvier (1817-29) practically adopted the classification of Brongniart (1799), in which four orders were recognized: (1) Chelonia; (2) Sauria (lizards and crocodiles); (3) Ophidia (serpents and provisionally the cæcilians); and (4) Batrachia, the latter corresponding to our present Amphibia minus the cæcilians. The splendid additions to our knowledge of their anatomical structure, made by such men as Johannes Müller in Germany, Owen and Huxley in England, and Cope in America, and an increased knowledge of the embryological development of some puzzling forms, has greatly added to the accuracy of our classification both of the Reptilia and the Amphibia. The light which has been shed on the relationship of the groups by paleontological researches of the past century particularly has also been of inestimable value in the establishment of our present classification, for which see **REPTILE**.

HERPETON (Gk. ἑρπετόν, reptile). An extremely rare snake of southeastern Asia. It belongs to a subfamily (Homalopsinæ) of colubrine viviparous water snakes, which prey upon fish and crustaceans, and often moor themselves by curling the prehensile tail about some water-side branch or root. This species (*Herpeton tentaculatum*) is peculiar in having two forward-pointing appendages covered with scales on the snout, supposed to be organs of touch. Cf. **LANGAHA**.

HERR, EDWIN MUSSEY (1860-). An American mechanical and electrical engineer, born at Lancaster, Pa. He graduated from Sheffield Scientific School (Yale) in 1884. Between 1886 and 1900 he was engineer of tests, superintendent of telegraph, and division superintendent on the Chicago, Burlington, and Quincy Railway. He was also division master mechanic on the Chicago, Milwaukee, and St. Paul (1891), general superintendent of the Grant Locomotive Works at Chicago (1892-93), general manager of the Gibbs Electric Company of Milwaukee (1894), assistant superintendent of motive power of the Chicago and Northwestern Railway (1895), and superintendent of motive power for the Northern Pacific (1896-98). From 1898 to 1905 he was general manager of the Westinghouse Air Brake Company, and from 1905 to 1911 vice president and director, and thereafter president, of the Westinghouse Electric and Manufacturing Company. In this latter position he had considerable difficulty with his employees, who went on a strike in 1914.

HERRERA, ár-rá'rá, **FERNANDO DE** (1534-97). A Spanish poet, born at Seville, the head

of the so-called Seville school of lyric poetry in the sixteenth century. When advanced in life, he took orders. He was master of the Greek, Roman, and Italian literatures, and was a man of prodigious learning. As a poet, he ranked so high in the opinion of his contemporaries that they bestowed upon him the appellation of the "divine." Like his acknowledged master, Garcilaso de la Vega, he sings chiefly in the foreign Italian strains and is particularly successful in the *canción* and the *soneto*. His masterpiece is the *canción* (or ode) *Por la Victoria de Lepanto*. Many of his erotic poems are remarkable for tender feeling, and his odes frequently display a lofty enthusiasm; but the expression is sometimes cast in too classical a mold and consequently wears a certain air of artificiality. Herrera himself prepared for publication a volume of his verse, *Algunas obras* (Seville, 1582), to which additions were made in an edition by Pacheco (1619). The poems are to be found also in Ramón Fernández, *Poesías castellanas* (Madrid, 1808), and in the *Biblioteca de autores españoles*, xxxii (Madrid, 1872); selections in Ford, *A Spanish Anthology* (New York, 1901). His chief historical work is the *Relación de la guerra de Chipre y batalla de Lepanto* (1572), and he translated from the Latin of Stapleton a life of Sir Thomas More. In 1580 he published an annotated edition of the poems of Garcilaso.

Bibliography. *Fernando de Herrera, Controversia sobre anotaciones á las obras de Garcilaso de la Vega: Poesías inéditas* (Seville, 1870); Lasso de la Vega, *Historia de la escuela poética sevillana* (Madrid, 1876); Morel-Fatio, *L'hymne sur Léopante* (Paris, 1893); Bourciez, in the *Annales de la Faculté des lettres de Bordeaux* (Bordeaux, 1891); Adolphe Coster, *Fernando de Herrera (el Divino)* (Paris, 1908); Coster, *Algunas obras de Fernando de Herrera* (ib., 1908); R. M. Beach, *Was Fernando de Herrera a Greek Scholar?* (Philadelphia, 1908); F. Rodríguez Marín, *El Divino Herrera y la Condesa de Gelves* (Madrid, 1911).

HERRERA, FRANCISCO DE (1576-1656), called EL VIEJO (the elder). A Spanish religious painter of the school of Seville. He was the first to emancipate himself from the Italian manner then dominant in Spain and to assume the vigorous naturalistic style afterward adopted by his pupil Velazquez (q.v.). He may therefore be regarded as the founder of the new national school of Spain. Herrera was born at Seville in 1576 and studied painting with Luis Fernandez, who painted in the Italian manner. He soon freed himself from this master and founded a school of his own; but his unbearable temper drove away his pupils, among whom was Velazquez, and even his own sons. A carver in bronze, Herrera was accused of counterfeiting money, and in order to avoid arrest he took sanctuary in the Jesuit College at Seville. While there, he painted the "Triumph of St. Hermengild," now in the Museum of Seville—a picture of such merit that when it was seen by Philip IV on his visit to the city he pardoned the artist. After his release Herrera became more unbearable than ever. His wife left him; his elder son, called El Rubio, died of consumption; and his younger, Herrera of Mozo, robbing his father of his money, fled to Italy. In 1650 the father went to Madrid, where he died in 1656.

His subjects are generally sombre and tragic

and are mostly of a religious nature, although he sometimes painted genre. They contain all the qualities of a great artist; a design grandiose but correct and true to nature, especially in the nudes; a harmonious color, laid on in great masses. His drawing is good, but his brushwork and rendering of tones are sometimes faulty, and his originality sometimes verges on extravagance. He painted both in oils and al fresco, but most of his fresco work has disappeared. His principal works are at Seville. Among them are the "Last Judgment," in the church of San Bernardo; four great pictures in the archiepiscopal palace, representing the "Fall of Manna," "Moses Smiting Water from the Rock," the "Marriage at Cana," and the "Miracle of the Loaves and Fishes"; "St. Peter," in the cathedral; "St. Basil," in the Museum; "St. Augustus" and "St. Jerome," in the Montpensier collection, Seville. The Louvre has two excellent examples—"St. Basil Dictating his Doctrine" and the "Israelites Gathering Manna in the Desert"; the Museum of Dresden, a "St. Matthew"; the National Gallery in London, "Christ Disputing with the Doctors," formerly attributed to Herrera's son. The frescoes with which he ornamented the façade of the convent of La Merced at Seville have perished, as have also those at Madrid. Luckily the artist himself etched a number of the latter, showing great skill in this branch of art, as is further evident from his print, "St. Peter."

His son, FRANCISCO HERRERA (1622-85), called EL MOZO (the younger), after he had fled to Italy, painted pictures of various subjects, especially of fish—the latter with such success that he was called "Il Spagnuolo degli Pesci." In 1656, after his father's death, he returned to Seville. In 1660 he was one of the founders of the academy there, but on account of his jealousy of Murillo (q.v.), who was made president, while Herrera was vice president, he went to Madrid in 1661. He became court painter to Philip IV and master of the royal works under Charles II. In this office he figured as an architect, assisting in the renovation of the cathedral of Saragossa. His work as a painter was brilliant, but baroque and manneristic. His works include the "Four Doctors of the Church Adoring the Host," Museum of Seville; the "Immaculate Conception" and "St. Hermengild," now in the Prado Museum; and the frescoes of the chapel of Our Lady of Atocha, "The Ascension of Mary," his chief work. Consult: Bermudes, *Diccionario de los más ilustres profesores* (Madrid, 1800); Sentenach, *Painters of the School of Seville* (London, 1907); Mayer, *Die sevillaner Malerschule* (Leipzig, 1911).

HERRERA, JOSÉ JOAQUÍN DE (1792-1854). A Mexican general, born at Jalapa. He entered the Spanish army as a cadet in 1809, served against the revolutionists (1810-14), and attained the rank of lieutenant colonel. He seconded Iturbide's Plan of Iguala in 1821 and took an active part in securing the Mexican independence. He then aided in the overthrow of Iturbide's empire and became Minister of War under the first President, General Victoria, in 1823. He was Minister of War and Marine in 1833 and later was President of the Supreme Court. He acted as President of the Republic a few months in 1844-45, was Santa Anna's lieutenant in the war with the United States, and was elected President in 1848, serving till 1851. A man of peace and honor, he did what he could

to secure the prosperity of the country, but was hindered by its disturbed conditions.

HERRERA, JUAN DE (1530-97). A Spanish architect, born in Mobillán, Asturias. He studied in Valladolid and Brussels and, returning to Madrid in 1566, became a pupil of Juan Bautista de Toledo. Upon the death of Toledo, Herrera was named royal architect by Philip II and was placed in charge of the construction of the Escorial (q.v.), in the plans of which he made notable changes. Among the more important structures for which he drew the plans are the Casa de Contratación in Seville, the cathedral at Valladolid, and the bridge of Segovia. He published a *Sumario y breve declaración de los diseños y estampas de la fábrica de San Lorenzo el Real del Escorial* (Madrid, 1589).

HERRERA Y TORDESILLAS, á tör'dá-sel'yás, ANTONIO DE (1559-1625). A Spanish historian, born at Cuéllar, the son of Rodrigo de Tordesillas and Inés de Herrera. He was educated in the humanities in Spain and Italy and became the private secretary of Vespasiano de Gonzaga, Viceroy of Navarra and Valencia. Gonzaga recommended him to Philip II, who made him one of the chroniclers of Castile and Chronicler of the Indies, the latter position carrying with it a handsome salary. He held these positions through the two succeeding reigns. His fame rests on his *Historia general de los hechos de los Castellanos en las islas y Tierra Firme del Mar Océano* (Madrid, 1601), which is preceded by *La descripción de las Indias occidentales*. The *Historia* is divided into eight decades and covers the history of America down to 1554. Herrera had access to the archives in its preparation, but he depended largely upon earlier manuscript accounts, including especially the history of Las Casas. He wrote many other works, dealing chiefly with the events of his time, among which are *Historia general del mundo del tiempo del señor rey D. Felipe segundo . . .* (Madrid, 1601, 1612); *Historia de lo sucedido en Escocia é Inglaterra en los cuarenta y cuatro años que vivia María Estuardo* (Madrid, 1589); *Historia de los sucesos de Francia desde el año 1585 hasta el de 1594* (Madrid, 1598). A number of his manuscripts exist in the Biblioteca Nacional at Madrid; his name is given in the *Catálogo de autoridades de la lengua*, published by the Academia Española.

HERREROS, BRETON DE LOS. See BRETON DE LOS HERREROS.

HERRESHOFF, hēr'rēs-hōf, JOHN BROWN (1841-1915). An American naval architect, born in Bristol, R. I., a brother of N. G. and J. B. F. Herreshoff, and a descendant of John Brown who headed the attack on the *Gaspée*. He early showed inventive ability and a love of the sea. Although he became blind at 15, he built up and managed, at Bristol, the house of Herreshoff, Stone & Co., which in 1879 became the Herreshoff Manufacturing Company, and which succeeded Edward Burgess as designer of the defenders of the *America's Cup*. Many stories are told of J. B. Herreshoff's wonderful grasp of detail and of his perfect freedom of movement in shop and on board ship.

HERRESHOFF, J(OHN) B(ROWN) FRANCIS (1850-). An American chemist, a brother of J. B. and N. G. Herreshoff. He was born at Bristol, R. I., and studied at Brown University, where he was professor of analytical chemistry in 1869-72. In 1876 he was superintendent of the Laurel Hill Chemical Works,

Long Island. He invented a process for the manufacture of sulphuric acid, became vice president and trustee of the Nichols Copper Company, received the Perkin medal (the first time it was awarded in the United States) for his work in the chemical and metallurgical industries, and was honored by Brown with the degree of Sc.D. in 1909.

HERRESHOFF, NATHANIEL GREENE (1848-). An American naval architect, born at Bristol, R. I., a brother of J. B. and J. B. F. Herreshoff. He was educated at the Massachusetts Institute of Technology and made a special technical study of engineering in the Corliss Works at Providence, R. I., where he assisted in the construction of the large engine which furnished motive power for all machinery at the Philadelphia Exposition of 1876. He became superintendent in 1881 of the Herreshoff Manufacturing Company, boat builders, at Bristol, R. I., and designed numerous torpedo boats and yachts. Among the high-speed torpedo boats designed by him for the United States government were the *Lightning* and the *Cushing*. His reputation in connection with racing yachts was established by the triumphs of the *Gloriana* in 1891. The success of the four craft built for contests in defense of the famous *America's Cup*, the *Vigilant* (1893), *Defender* (1895), *Columbia* (1899), and *Reliance* (1903), placed him among the foremost of his profession. He also designed the *Resolute* for the *America's Cup* race of 1914, which was declared off on account of the war in Europe. He introduced many innovations in the architecture of racing yachts. See YACHT AND YACHTING.

HER/RICK, CHARLES JUDSON (1868-). An American neurologist. Born at Minneapolis, Minn., he graduated from the University of Cincinnati in 1891, from Denison University (M.S.) in 1895, and from Columbia (Ph.D.) in 1899. He taught natural sciences at Granville Academy (1891-92) and at Ottawa University (1892-93), was an associate in comparative neurology of the Pathological Institute of the New York State Commission in Lunacy (1897-1901), and at Denison was an instructor (1895-96) and professor of zoölogy from 1898 to 1907, when he became professor of neurology at the University of Chicago. In 1894 he became managing editor of the *Journal of Comparative Neurology*. His investigations deal particularly with the cranial nerves and with the comparative histology of the medulla oblongata.

HER/RICK, CHRISTINE TERHUNE (?-). An American writer on domestic science, daughter of "Marion Harland" (Mary Virginia Terhune, q.v.), born at Newark, N. J. In 1884 she was married to James Frederick Herrick, who died in 1893. She became a contributor to the *Ladies' Home Journal*, the *Woman's Home Companion*, and other women's magazines. In 1908-12 she was one of the managers of the Chamber Recital Company. Her writings include: *Liberal Living upon Narrow Means* (1890); *Chafing-Dish Supper* (1895); *The National Cook-Book* (1897), with Marion Harland; *Like Mother Used to Make* (1912); *My Boy and I* (1913). She edited the *Consolidated Library of Cooking and Household Recipes* (5 vols., 1905).

HER/RICK, EDWARD CLAUDIUS (1811-62). An American meteorologist, born in New Haven, Conn. He was librarian at Yale College from 1843 to 1858 and treasurer from 1852 until his death. He made noteworthy contributions to the

knowledge of meteorology, meteoric showers, the aurora borealis, and the zodiacal light. He was likewise an entomologist of distinction and devoted nine years to the study of the Hessian fly and its parasites. There is a window to him in Battell Chapel, Yale. He published *The Hessian Fly*, United States Patent Office Report, 1844, pp. 161-167 (Washington, 1845).

HERRICK, FRANCIS HOBART (1858-). An American biologist. He was born at Woodstock, Vt., and graduated from Dartmouth College in 1881 and from Johns Hopkins University (Ph.D.) in 1888. He became instructor in 1888 and professor of biology in 1891 at Western Reserve University. Besides publishing the results of his investigations on the origin and development of the instincts, he is author of *The American Lobster* (1895); *Home Life of Wild Birds* (1901, 1905); *Natural History of the American Lobster* (1911).

HERRICK, MYRON T. (1855-). An American public official and diplomat, born at Huntington, Ohio, and educated at Oberlin College and Ohio Wesleyan University. Admitted to the bar in 1878, he practiced at Cleveland, Ohio, until 1886, when he turned his attention to railroad and banking activities. Becoming interested in politics, he was a member of several Republican national conventions, was a presidential elector in 1892, served as a member of the Republican State Executive Committee and of the Republican National Committee, and was colonel on the staff of William McKinley, then Governor of Ohio. In 1903-06 he himself was Governor of the same State. He was appointed Ambassador to France by President Taft in 1912, and under President Wilson was for some time acting Ambassador. In the latter capacity he was continued until Dec. 1, 1914, some months after the arrival of his successor, because of the unsettled condition of France during the European War and his familiarity with the situation. He rendered conspicuous service in aid of a large number of Americans who were caught in France at the beginning of the war, and was decorated with the Grand Cross of the Legion of Honor. He published *Rural Credits* (1914).

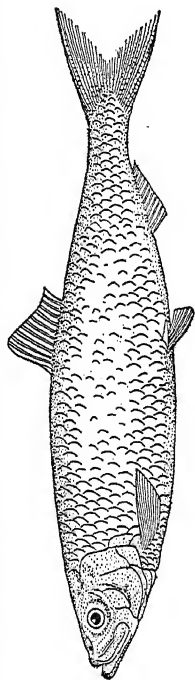
HERRICK, ROBERT (1591-1674). An English poet, born in London. He was educated at Cambridge and in 1629 was presented to the vicarage of Dean Prior, Devonshire. Ejected from his parish by the Long Parliament in 1647, he repaired to London. In 1648 appeared a collection of his poems, in two parts, bound together, bearing the titles *Hesperides* and *Noble Numbers*. Though, as a matter of fact, the two volumes named appeared in 1648, the latter was dated 1647. Some of these poems, however, had been finding their way into print ever since 1635. On the restoration of Charles II he was reinstated in his old living, where he died. Herrick's poems fall into three groups: his epigrams, which are coarse and heavy-handed in both feeling and expression; religious poems, many of which belong to the rather small company of "divine" lyrics in English that are of fine poetic quality; and perhaps 1000 secular poems, chiefly amatory or descriptive, which constitute the body of his work. Herrick's great distinction lies in the delicious freshness of his diction, the inspired felicity of his phrasing, and the uncloying sweetness and varied cadences of his well-nigh incomparably melodious verse. He is distinguished, too, as a poet whose genius

taught him to distill from rural life, rural scenes, and country sports the very essence of their beauty and delight. His contemporaries, if they valued him, have left no record of their appreciation to posterity, and for more than 100 years after his death he was neglected—a neglect for which, however, the numerous editions of him in the nineteenth century handsomely atone. To lovers of poetry of our own time scores of his lyrics are familiar and justly prized for their exquisite sentiment, their descriptive loveliness, and their beauty of form—witness such songs as "Corinna's Maying," "Cherry Ripe," and "Gather ye Rosebuds." There are editions of his poems by Hazlitt (London, 1869), Grosart (ib., 1876), Palgrave (selections, ib., 1877), Pollard, with critical essay by Swinburne (ib., 1891), Saintsbury in *Aldine Poets* (2 vols., ib., 1893), and F. W. Moorman (Oxford, 1914). Consult an essay by Gosse in *Seventeenth Century Studies* (ib., 1883); F. W. Moorman, *Robert Herrick: A Biographical and Critical Study* (New York, 1910); and the study of Herrick in *Cambridge History of English Literature* (ib., 1907-).

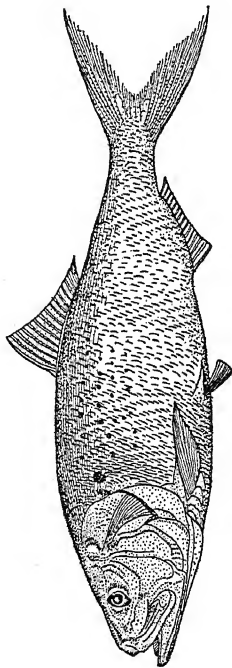
HERRICK, ROBERT (1868-). An American university professor and novelist. His stories include broad pictures of American life, East and West and in town and country; they are much concerned with such problems of sex discord as Ibsen and Sudermann discuss, and with the clash of commercialism and idealism. Born at Cambridge, Mass., he graduated from Harvard in 1890 and afterward taught at Massachusetts Institute of Technology and at the University of Chicago, where he became professor of English in 1905. His first noteworthy novel—preceded by *The Man Who Wins* (1895) and *Literary Love Letters and Other Stories* (1896)—was *The Gospel of Freedom* (1898), its theme the revolt of women against the trammels of social conventions. This book was followed by *Love's Dilemmas* (1898), *The Web of Life* (1900), *The Real World* (1901), *Their Child* (1903), and *The Common Lot* (1904). The last-named book is one of its author's outstanding works—a study of a young architect's struggle between his artistic ideals and the lure of business success—and in the same class is *The Memoirs of an American Citizen* (1905), in which the problems of "big business," honest and dishonest, are worked out in the milieu of pork-packing magnates who are miscellaneous potent in other fields of industry and finance. In *Together* (1908) we have a study, frank and thought-provoking, of American marriage and the conditions at war with domestic compatibilities, motherhood, and family solidarity—a novel recognized at home and abroad as reaching a high standard. *A Life for a Life* (1910) is a somewhat tangled presentation in the form of fiction of many social and economic problems now pressing for solution. Books by this author, other than those above named, are: *The Master of the Inn* (1908); *The Healer* (1911); *One Woman's Life* (1913); *His Great Adventure* (1913); *Clark's Field* (1914). Consult F. T. Cooper, *Some American Story Tellers* (New York, 1911), and E. Björkman, *Voices of To-Morrow* (ib., 1913).

HERRIDGE, WILLIAM THOMAS (1857-). A Canadian clergyman and author. He was born in Reading, England, but was brought to Canada in his youth. After graduating from Toronto University with high honors in 1880, he studied at the Montreal Presbyterian College and at Edinburgh, Glasgow, and London.

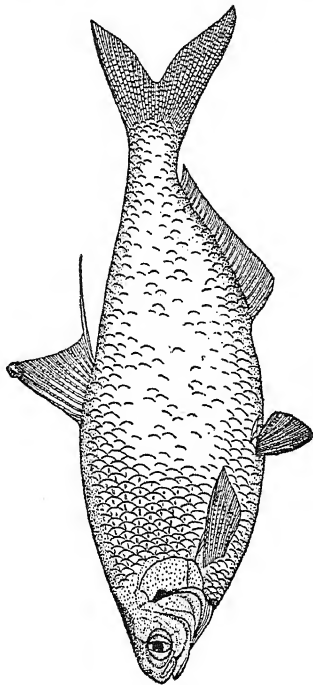
HERRING AND SHAD



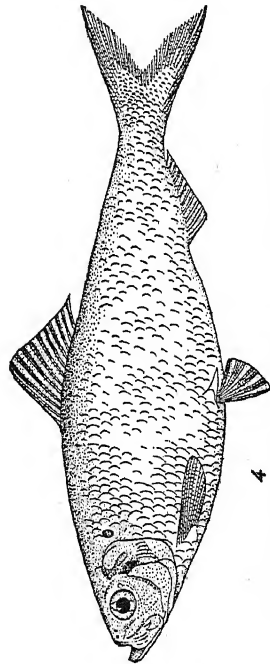
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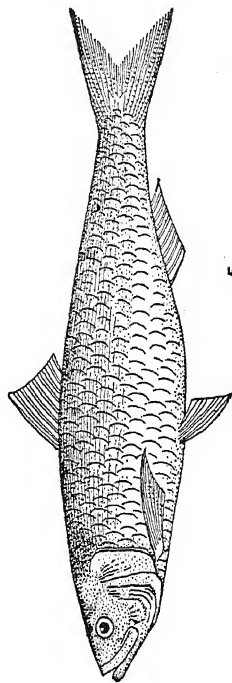
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1. COMMON HERRING (*Clupea harengus*).
2. MENHADEN (*Brevoortia tyrannus*).

3. MUD or HICKORY SHAD (*Dorosoma cepedianum*).
4. ALEWIFE (*Pomolobus æstivalis*).
5. PILCHARD (*Clupea pilchardus*).

In 1883 he was ordained a Presbyterian minister, and in 1884 he became pastor of St. Andrew's Church, Ottawa; in 1906 he was appointed a member of the Committee on Union of the Presbyterian, Methodist, and Congregational churches of Canada; and in 1914 he was elected moderator of the General Assembly of the Presbyterian Church in Canada. He became widely known as an able and eloquent preacher. He published several essays on literary subjects and also *The Orbit of Life: Studies in Human Experience* (1906) and *The Coign of Vantage* (1908).

HERRIG, hër'rik, HANS (1845-92). A German poet and dramatist, born in Brunswick. He studied law at Berlin and Göttingen, and at first was employed in the Berlin city court, but after 1872 devoted himself entirely to literature, was one of the editors of the *Deutsches Tageblatt* from 1881 to 1889, and wrote many plays that attained wide popularity. His *Festspiel*, written for the Luther Jubilee in 1883, was especially successful. His dramas, which are more distinguished for elegance and force of diction than for positive dramatic skill, comprise: *Alexander der Grosse* (1872); *Kaiser Friedrich der Rotbart* (1873); *Jerusalem* (1874); *Der Kurprinz* (1876); *Konradin* (1881); *Harald der Wikung* (1881), which was set to music by Andreas Hallén; *Drei Operndichtungen* (1881); *Nero* (1883); *Columbus* (1887); and *Christnacht* (1887). His other writings are: *Die Schueine* (1876), an epic; *Mären und Geschichten* (1879); *Der dicke König* (1885); *Die Meininger, ihre Gastspiele und deren Bedeutung für das deutsche Theater* (1879); *Luustheater und Volksbühne* (1886); *Ueber christliche Volksschauspiele* (1891); and *Das Kaiserbuch* (1891). His collected works appeared in seven volumes (1887-90).

HERRIN, hër'in. A city in Williamson Co., Ill., 10 miles northwest of Marion, on the Chicago, Burlington, and Quincy, the Illinois Central, and the St. Louis, Iron Mountain, and Southern railroads (Map: Illinois, F 10). There are 24 coal mines in the city and several others in the vicinity. The industrial establishments include machine shops, a foundry, and a powder plant. The water works are owned by the municipality. Pop., 1900, 1559; 1910, 6861.

HERRING (AS. *hæring*, OHG. *harinc*, Ger. *Hering*, herring, from AS. *here*, OHG. *hari*, *heri*, Ger. *Heer*, army; in allusion to the shoals in which the fish moves). A fish of the family Clupeidae, belonging to the genus *Clupea*, very closely related to the shads and sardines. Herring are soft-rayed fishes, with a compressed body and rather large cycloid scales. The head is naked, and the caudal fin is forked. They occur in all the northern seas, usually never very far from land, and make periodic migrations from the deeper waters still closer to the shore for the purposes of spawning. In the more northern regions this occurs during the spring and early summer; in the more southern regions, in July to December. The average yield of eggs is about 30,000 to the fish, with a maximum of about 55,000. They are laid in shallow waters and are slightly glutinous, sticking in clumps to rocks, etc., on the bottom. The young herring probably remain on the shallow-spawning beds all the year. At this period of spawning they swim in great schools and are taken in vast numbers for commercial purposes. The herring fisheries are very extensive both in Eu-

rope and America. The estimated annual catch is 3,000,000,000, weighing one-half that many pounds. They are largely smoked, salted, and canned. The young in certain regions are canned as sardines. Fresh herring are much used as bait for cod and other fishes taken by line. See FISHERIES.

Herring live on minute crustaceans and larval forms of a great variety of animals, which they strain out of the water, and are themselves preyed upon to an enormous extent by cod, haddock, sharks, and other fishes, and by sea birds.

The common herring (*Clupea harengus*) frequents both sides of the Atlantic southward to the thirty-seventh parallel. It attains a maximum length of about 17 inches, the usual average being about 12 inches. The California herring (*Clupea pallasii*) strongly resembles the Atlantic one in form and habit and is about equally abundant and an important food fish. There are other less valuable species, belonging to this or a related genus. Thus, the various species of alewife (q.v.) are known as herrings, with distinguishing adjectives. The lake (or Michigan) herring, however, is an entirely unrelated form, being a salmonoid (see CISCO), although greatly resembling the common herring in form and general appearance. Consult, for an extensive natural history of the herring family, Goode, *Fishery Industries*, section i (Washington, 1884), and the fishery reports of Scotland and Germany. See Plate of HERRING AND SHAD.

HERRING, FRANCES ELIZABETH (1853-). A Canadian journalist and author. She was born at King's Lynn, Norfolk, England, and was educated there and at Reading. She went to British Columbia in her youth and for some time was a teacher, but later she took up newspaper work and wrote sketches and descriptions of Western life for the press. She published: *Canadian Camp Life* (1900); *Among the People of British Columbia* (1903); *In the Pathless West, with Soldiers, Miners, Pioneers, and Savages* (1904); *Gold Hunters of the West* (1911); and *Nan and Other Pioneer Women of the West* (1913).

HERRING, JOHN FREDERICK (1795-1865). An English animal painter, born in Surrey. Starting as a carriage painter, his love of horses brought him to the box, and for four years he drove the famous stagecoach known as "the York and London Highflyer." In his leisure hours he studied art and took a few lessons from Abraham Cooper. His racing and coaching pictures, which have often been lithographed, became the fashion, and for half a century, from 1816 to 1868, he exhibited regularly at the Royal Academy and elsewhere. Among his patrons were King George IV, Queen Victoria, and the Duke of Orléans. Frith, whom he helped with the racer in his famous "Derby Day," speaks of him in his *Autobiography* as "one of the best painters of the race horse I have ever known." Besides "A Frugal Meal," a study of three horses' heads, in the National Gallery, there are also paintings by him in the museums at Dublin, Glasgow, Leeds, Leicester, Melbourne, and Reading. He combined minute detail with strong realism.

HERRING, PERCY THEODORE (1872-). A British physiologist, born in Yorkshire and educated at Christ's College, Christchurch, New Zealand, and at Otago and Edinburgh universi-

ties. At Edinburgh he was lecturer on histology and then became Chandos professor of physiology at St. Andrews. In 1898-99 he was president of the Royal Medical Society. His distinctive work was in experiment on animals, e.g., on cold and reflex action and the series of experiments with dogs on which was based the Schäfer method of resuscitation from drowning (1904).

HERRINGBONE MASONRY. See **MASONRY**.

HERRING GULL. See **GULL**.

HERRING HOG. A porpoise; especially, in New England, the common small harbor porpoise, also called puffing pig. See **PORPOISE**.

HERRINGS, BATTLE OF THE. See **FASTOLF, SIR JOHN**.

HERRMANN, ALEXANDER (1844-96). An American prestidigitateur, born in Paris. After public performances in various European cities from 1856, he appeared in 1861 in the United States and in the same year was naturalized. He traveled professionally all over the world, even to the Far East, the home of the sleight-of-hand art, where he was received with amazement. In 1874 he made his first transcontinental tour of the United States. As a master of pure sleight of hand, and as a performer who united the entertaining with the mystifying, he has perhaps never been surpassed.

HERRMANN, hër'mân, or HEERMANS, hâr'mâns, or HARMAN, hâr'mân, AUGUSTINE (1605-86). An American colonist, active chiefly in the affairs of New Netherland and afterward in those of Maryland. He was born in Prague, Bohemia, and after receiving an excellent training in modern languages and mercantile life, entered the service of the Dutch West India Company. He settled in New Amsterdam as early as 1643, took an important share in the civic life of the Dutch settlements, and was of much service in regulating the relations of New Netherland with Rhode Island and Maryland. Having been sent to Maryland in 1659 to uphold the rights of New Netherland as against the claim of Lord Baltimore to the Delaware River, he presented the case of his Colony with great force, and the State of Delaware may in some measure owe its existence to the arguments established on that occasion. He made a map of Maryland and Virginia, which was first published in 1670 and is remarkably accurate in the tidewater section. For this map he received from Lord Baltimore an extensive grant of land in Cecil Co., Md., with manorial privileges. He was given the title of Lord of Bohemia Manor, became a member of the Governor's Council, a justice of Baltimore County, and in 1678 was made a commissioner to treat with the Indians. His descendants were lords of Bohemia Manor until 1735.

HERRMANN, hër'mân, ERNST ADOLF (1812-84). A German historian, born at Kämmerwalde. He studied at Dorpat, and at Berlin under Ranke, and then lived in Dorpat (1837-39) and in Dresden. In 1847 he became docent at Jena, then professor of history there, and afterward (1857) at Marburg. His work was mostly on the history of Russia; especially important was his completion of Strahl's *Geschichte des russischen Staates* (1846-66). Among his other writings are: *Beiträge zur Geschichte des russischen Reichs* (1843); *Die österreichisch-preussische Allianz vom 7. Februar 1792 und die zweite Teilung Polens* (1861),

which contained an attack on the historian Von Sybel; and *Peter der Grosse und der Zarzewitsch Alewei* (1880).

HERRMANN, WILHELM (1846-). A German Protestant theologian, born in Melkow (near Jerichow), Saxony, where his father was pastor. He was educated at Halle, where he became lecturer in 1874, after fighting in the Franco-Prussian War. In 1879 he was appointed professor of systematic theology in the University of Marburg. Herrmann is to be classed among the followers of Ritschl, whose work he criticized in *Der evangelische Glaube und die Theologie A. Ritschls* (2d ed., 1896). Among his other important works are: *Bedeutung der Inspirationslehre für die evangelische Kirche* (1886); *Begriff der Offenbarung* (1887); *Gewissheit des Glaubens* (2d ed., 1889); *Der Verkehr des Christen mit Gott* (1886; 6th ed., 1908; Eng. trans. by Stanyon, 1895); *Römische und evangelische Sittlichkeit* (3d ed., 1903); *Sittliche Weisungen Jesu* (1904; 2d ed., 1907); *Offenbarung und Wunder* (1908); *Ethik* (4th ed., 1909); *Die Not der evangelischen Kirche und ihre Ueberwindung* (1913). Harnack and Herrmann's *Essays on the Social Gospel* appeared in English (trans. by Craik) in 1907.

HERRNHUT, hërnhoot. A small town in the Kingdom of Saxony, situated on the south slope of the Hutberg, 1120 feet above the sea, 11 miles from Zittau (Map: Germany, F 3). It is noted throughout Germany as the central seat and birthplace of the present Moravian Brotherhood. The town has manufactures of linen, cotton, and bleached goods, and furniture. Its products are famous all over Germany. There are here a monument to Count Zinzendorf, a fine church, a school for choral music, an ethnographic museum, and other institutions belonging to the Moravian church. The community was founded in 1722 by a colony of persecuted Moravians, some of whom were descended from the old Bohemian and Moravian Brethren. In coming into Saxony they were sheltered and protected by the pious Count Zinzendorf, to whom Herrnhut belonged. Pop., 1900, 1242, including 830 Moravians; 1910, 1384.

HERRON, FRANCIS JAY (1837-1902). An American soldier, born in Pittsburgh, Pa. Graduating at the Western University of Pennsylvania (later the University of Pittsburgh) in 1853, after 1856 he was engaged in business in Iowa. He served in Iowa volunteer regiments in the Civil War, becoming brigadier general of volunteers in July, 1862, for a time commanding the Army of the Frontier, and being made major general of volunteers in November, 1862. At Vicksburg he commanded the left wing of the investing forces and at the close of the war received the surrender of the Confederate forces west of the Mississippi. He resigned in 1865, entered on the practice of law in New Orleans, was United States marshal of the District of Louisiana from 1867 to 1869, and was Secretary of State of Louisiana in 1872-73. Subsequently he practiced law in New York City.

HERRON, GEORGE DAVIS (1862-). An American clergyman and writer, born at Montezuma, Md., and educated at Ripon College, Wisconsin. He held Congregational pastorates at Lake City, Minn., and Burlington, Iowa, and in 1893 became professor of applied Christianity in Iowa College. Opposition to his teachings led him to resign in 1900, and he then initiated a social crusade in Chicago and New York,

founded the *Social Crusader*, and lectured upon "The Economics of the Kingdom of Heaven" and similar topics, chiefly advocating a transformation of the present economic order in conformity with the Christian principle of the brotherhood of men. He aroused great controversy throughout religious circles generally in 1901 by his separation from his wife, his second marriage, and his published theories regarding a free marriage relation. At a meeting of the Iowa Congregational Council he was deposed from membership. Later he took up his residence in Italy, where he devoted his time to literary work. His principal writings are: *The Larger Christ* (1891); *The Call of the Cross* (1892); *A Plea for the Gospel* (1892); *The New Redemption* (1893); *The Christian Society* (1894); *The Christian State* (1895); *Social Meaning of Religious Experiences* (1897); *Between Cæsar and Jesus* (1899); *Why I Am a Socialist* (1900); *Wagner and Parsifal* (1903); *The Day of Judgment* (1904).

HERSART, T. C. H. See LA VILLEMARQUÉ, VICOMTE DE.

HERSCHEL, hē'shəl, CAROLINE LUCRETIA (1750-1848). A German-English astronomer, sister of Sir William Herschel. She was born at Hanover and lived there till 1772, when she went to England to live with her brother at Bath. When he turned astronomer, she became his constant helper, and on his being appointed private astronomer to George III acted as his assistant in the famous observatory at Slough, receiving a small salary from the King. She found time for a series of independent observations with a small Newtonian telescope made for her by her brother. Her special occupation was to scan the heavens for comets, seven of which she discovered, in regard to five of which she has the credit of priority of discovery; and several remarkable nebulae and clusters of stars included in her brother's catalogues were described from her original observations. In 1798 she published *A Catalogue of Stars taken from Mr. Flamsteed's Observations, etc.* This work was published at the expense of the Royal Society and contained 561 stars omitted in the British catalogue. She lived with her brother during the whole of his career and on his death, in 1822, returned to her native country. In 1828 the Royal Society conferred on her their gold medal for completing the catalogue of nebulae and clusters of stars observed by her brother. She was afterward chosen an honorary member of the Royal Society. Consult M. C. Herschel, *Memoir and Correspondence of Caroline Herschel* (London, 1876), and Clerke, *The Herschels and Modern Astronomy* (ib., 1895).

HERSCHEL, JOHN (1837-). An English astronomer, son of Sir J. F. W. Herschel, born at the Cape of Good Hope. He served for a few months in 1859 in India in the Bengal Engineers, which he had entered in 1856, and then was appointed to the Trigonometrical Survey, where he served until his retirement in 1886. In 1868 and 1871 he observed total eclipses of the sun for the Royal Society and made important discoveries in regard to the spectrum of the corona.

HERSCHEL, SIR JOHN FREDERICK WILLIAM (1792-1871). An eminent English astronomer, the only son of the astronomer William Herschel. He was born at Slough, near Windsor, March 7, 1792, and was educated at St. John's College, Cambridge. His first publication was *A Collec-*

tion of Examples of the Application of the Calculus of Finite Differences (1820). In 1822 he applied himself especially to astronomy, using his father's methods and instruments in observing the heavens. For a time he worked with Sir James South in reexamining the nebulae and clusters of stars described in his father's catalogues. The results of the reexamination were given in 1833 to the Royal Society in the form of a catalogue. The catalogue contained observations on 525 nebulae and clusters of stars not noticed by his father and on a great number of double stars—in all, between 3000 and 4000. His "Treatise on Sound" appeared in the *Encyclopædia Metropolitana* in 1830, and his "Treatise on the Theory of Light" in the same work in 1831, in which year also appeared in Lardner's *Cyclopædia* his "Preliminary Discourse on the Study of Natural Philosophy." In 1836 appeared his "Treatise on Astronomy," in Lardner's *Cyclopædia*. At this time Herschel was at the Cape of Good Hope, where he arrived in January, 1834, with the intention of completing the survey of the sidereal heavens by examining the Southern Hemisphere as he had done the Northern. Here he established his observatory at a place called Feldhausen, 6 miles from Table Bay. On March 5, 1834, he began his observations, which were embodied in his *Results of Astronomical Observations Made during 1834-38 at the Cape of Good Hope; Being a Completion of a Telescopic Survey of the Whole Surface of the Visible Heavens, Commenced in 1825* (1847). On his return to England, in 1838, honors were showered on him. He had been awarded the Royal Society's gold medal in 1826; he now was made a D.C.L. of Oxford, was created Baronet, and succeeded the Duke of Sussex as president of the Royal Society, and in 1848 he became president of the Royal Astronomical Society. In 1849 he published his *Outlines of Astronomy*. In 1850 he was appointed master of the mint. This office, on account of ill health, he resigned in 1855. Consult Clerke, *The Herschels and Modern Astronomy* (London, 1895). For a list of his contributions, consult the Royal Society's great catalogue.

HERSCHEL, SIR WILLIAM (1738-1822). An eminent German-English astronomer, born at Hanover, Germany, Nov. 15, 1738. The son of an army musician, he was trained in his youth to follow his father's profession. After serving for four years as oboist in the band of the Hanoverian Guards, he went to England in 1757. His first few years in that country were spent in privation, but subsequently he became a military bandmaster at Leeds. In 1765 he became organist at Halifax and a year later removed to Bath, where he was appointed to the post of organist of the Octagon Chapel. At Bath he would seem to have become interested in astronomy and during his spare moments devoted himself assiduously to the study of that and kindred sciences. The wonders revealed to him by a small hired telescope stimulated his desire to become the possessor of a larger instrument, and in 1773 he set about making for himself a Gregorian telescope of 5½-foot focal length, which he completed in the following year. His two great ambitions were "to carry improvements in telescopes to their utmost extent" and "to leave no spot of the heavens unexamined," and with these in view he steadily increased the power of his tele-

scopes, and mirrors of 7-, 10-, and even 20-foot focal length were produced in rapid succession in his workshop. Before 1795 he had constructed no less than 430 mirrors, ranging in focal length from 7 to 20 feet, besides many smaller ones. His supreme achievement in telescope making was the construction of a giant reflector of 40-foot focal length and 4-foot aperture, which was begun in 1785 and finished in 1789.

In 1775 Herschel began the first of his four reviews of the heavens, in which he undertook an exhaustive survey of the stars in regular order, examining them in all their groups through the same instrument. In 1781, while engaged in his second review with the aid of a 7-foot Newtonian reflector, he made his first discovery—a new planet, which at first he supposed to be a comet. The true nature of this object was soon recognized, and its discoverer named it *Georgium Sidus*, in honor of George III, while continental astronomers gave it the name *Herschel*; both names, however, were relinquished in favor of *Uranus*, the name by which the planet is now known. For this discovery he was awarded the Copley medal and elected a fellow by the Royal Society in 1781, and in 1782 he was appointed private astronomer to George III, with a salary of £200 a year. He then went to live at Datchet, where, assisted by his sister Caroline (q.v.), he continued his researches. In 1785 he removed to Clay Hall, near Windsor, and in 1786 to Slough, where he resided until his death. He was knighted by George III, and made a D.C.L. by the University of Oxford; the universities of Edinburgh and Glasgow also conferred honorary degrees upon him, and he was honored by election to membership in the leading scientific societies of Europe and America. In 1821 he became the first president of the Royal Astronomical Society. Partly through his wife's jointure, and partly through the sale of mirrors for reflecting telescopes, he acquired considerable wealth. He died at Slough, Aug. 25, 1822.

Herschel made his first communication to the Royal Society in 1780 and during the next 39 years contributed no less than 69 papers to the *Philosophical Transactions*, forming a collection remarkable for their originality and acuteness of treatment. He also contributed a paper, "On the Places of 145 New Double Stars," to the first volume of the *Memoirs of the Astronomical Society*. He has been justly called the founder of sidereal astronomy. By his comprehensive and systematic sweeping of the heavens he greatly extended our knowledge of the solar system, discovering the planet *Uranus* and two of its satellites, and adding two more—*Enceladus* and *Mimas*—to the satellites of *Saturn* previously known. He also made the first determination of the period of rotation of *Saturn* and investigated that of *Mars*. From his observations of the proper motions of certain stars, he was led to the conclusion that the apex of the sun's way (q.v.), or the point towards which the solar system is traveling in space, is situated in the constellation *Hercules*, within a few degrees of position assigned to it by the most recent investigators. His contributions to our knowledge of the universe were no less important. By his discovery of the motions of binary stars he established the existence of stellar systems other than our own. His researches on the Milky Way and the constitution of nebulae may be said to have given us our first real concep-

tion of the immensity of the universe. When in 1780 he began his researches, barely 100 nebulae were known; Messier's catalogue, published in 1781, comprised only 103 entries. Herschel's observations in the course of the next 20 years brought the number up to nearly 2500, and through him the nebulae acquired a new importance in the universe. In the earlier period of his researches he advanced the theory that the nebulae were clusters of stars, the component stars being too faint, on account of their immense distance, to be seen separately. Later he revised his views, and, in order to explain some of the nebulae, among them the nebula in *Orion*, he reverted to the old theory that the nebulae were masses of a shining fluid of an unknown nature. His catalogues of double stars and nebulae, his work on stellar photometry, and his discovery of the infra-red solar rays would of themselves entitle him to the first rank as an astronomer and physicist. Consult: Wolf, *Geschichte der Astronomie* (Munich, 1877); Holden, *Sir William Herschel: His Life and Works* (New York, 1881); Sime, *William Herschel and his Work* (ib., 1900); Dreyer, *A Short Account of Sir William Herschel's Life and Works* (London, 1912). Sir W. Herschel's scientific papers, previously unpublished, were collected and edited, under the direction of the Royal Society and the Royal Astronomical Society, in 1912.

HERSCHELL, FARREER, LORD (1837-99). An English lawyer. After completing his academic training at Bonn and University College, London (B.A., 1857), he was called to the bar in 1860 and, devoting himself to commercial law, was elected queen's counsel in 1872. He was recorder of Carlisle in 1873-80, member of Parliament for Durham (1874-85), and Solicitor-General under Gladstone (1880). Having been knighted in 1880, he was raised to the peerage six years later and made Lord Chancellor. He was president of the royal commission to inquire into the proceedings of the Metropolitan Board of Works (1888), was once more Lord Chancellor (from 1892 to 1895), and from 1893 until his death was chancellor of London University. He died in Washington, D. C., while serving as chairman of the Anglo-American Commission, appointed to settle questions relating to the boundary between the United States and Canada.

HERSENT, ar'sân', LOUIS (1777-1860). A French painter and lithographer, born in Paris. He studied under Regnault, and won the second Prix de Rome in 1797 with his "Death of Cato." He reappeared at the Salon in 1804 with great success. In 1824 he became Officer of the Legion of Honor, and in 1825 professor at the Beaux-Arts. His lithographs are attractive—some portraits, others illustrations of *La Fontaine* and *Theocritus*. Among his paintings are "Capture of Landshut," "Louis XVI Distributing Charity," "The Duke of Bordeaux and his Sister," at Versailles; "Diana and Endymion," "The Graces and Daphnis," at Sens; "Narcissus," at Arras; portraits of Louis Philippe, at Dieppe; of Marie-Amélie, at Chantilly; of Henry IV, at the Trianon. His figures are ridiculously slender, as was then the fashion, and his style is classical.

HERSFELD, hêrs'fêlt. An ancient town in the Prussian Province of Hesse-Nassau, situated on the Fulda, 23 miles by rail from Fulda (Map: Germany, C 3). It still retains a portion of its old fortifications and contains

the thirteenth-century Stadt church, with fine stained-glass windows; the ruins of an eleventh-century collegiate church, destroyed by the French in 1761; the remains of the Benedictine abbey of Hersfeld; and an old Rathaus. There are manufactures of cloth, cotton goods, rope, roofing paper, cement, and leather. The abbey of Hersfeld, founded in 770, by Lullus, Archbishop of Mainz, enjoyed great renown through the Middle Ages. Pop., 1900, 7908; 1910, 9612.

HERSFELD, LAMBERT VON. See **LAMBERT VON HERSFELD.**

HERSHEY, AMOS SHARTLE (1867-). An American professor of political science, born at Hockersville, Pa. He was educated at Harvard College and Law School (A.B., 1892), and studied also at the University of Heidelberg (Ph.D., 1894) and at Paris (1894-95). On the faculty of Indiana University he served as assistant professor of political science (1895-1900), as associate professor of European history and politics (1900-05), and as professor of political science after 1905. Besides his contributions on political science and law he is author of *The International Law and Diplomacy of the Russo-Japanese War* (1907) and *The Essentials of International Public Law* (1912).

HERSTAL, hēr'stāl, or HERISTALL. A manufacturing and mining place in the Province of Liège, Belgium, extending along the left bank of the Meuse for about 3 miles below the city of Liège. Some ruins still exist of the castle of Herstal, the birthplace of Pepin le Gros (father of Charles Martel, and great-grandfather of Charlemagne), from which he has his title of Pepin of Herstal. It is an important iron and steel centre; a national arms and cannon factory is located here; it also manufactures bicycles, and coal is mined near by. Pop., 1900, 18,195; 1903, 19,477; 1910, 22,909.

HERTEL, hēr'tel, ALBERT (1843-1912). A German landscape and still-life painter, born in Berlin. He studied at the Berlin Academy, where he became professor in 1875, and of which he was elected a member in 1901. His landscapes are notable for style and fine coloring; among them are: "The Via Flaminia" (1872); "Olive Harvest in Capri" (1872); "After the Storm on the Coast of Genoa" (1873) and "Northern Coast Scene with Fishermen Returning" (1883), both in the National Gallery, Berlin; "Road between Rapallo and Santa Margherita" (1892), bought by Emperor William II; and "View in the Roman Campagna" (1896). He also painted decorative subjects.

HERTEL DE ROUVILLE, ār'tel' de rōō-vèl', FRANCIS (1643-1722). A Canadian soldier, born in Three Rivers, Maurice Co., Quebec. As a woodsman and Indian fighter, he was widely known for valor and resourcefulness. Captured by the Iroquois in 1681, he bore various tortures with such fortitude that, instead of being put to death, he was adopted by the tribe. After a time, however, he escaped from the Indians and rejoined his comrades. Acting as one of Frontenac's lieutenants in 1690, he ravaged settlements in the lower part of Maine, escaped by adroitness from the greatly superior force of the English colonists, and united with the band attacking Falmouth, now Portland, where his strategy aided in the speedy capture of the village. Louis XIV promised to reward him with letters of nobility, which he did not receive, however, until 26 years afterward.

HERTER, hēr'tēr, ALBERT (1871-).

An American decorative and figure painter and designer. He was born in New York City, studied with Carroll Beckwith at the Art Students' League there, and in Paris with Corman and J. P. Laurens, and afterward came under the influence of the art of Japan while in that country. His "Two Boys" is in the Metropolitan Museum, New York. Of great technical ability, in water color as well as in oil, he produced notable work even as a youth. His mural paintings and designs for tapestries and other textiles are usually delicate in color and often gracefully composed; but his easel paintings, though calculated to make themselves felt in a crowded gallery, lack personality and definite point of view. He won numerous medals and prizes and became an associate of the National Academy and a member of the American Water Color Society and of the Society of Mural Painters.

HERTER, hēr'tēr, ERNST GUSTAV (1846-). A German sculptor, born in Berlin. He studied at the Berlin Academy and as a pupil of August Fischer, Bläser, and Albert Wolff, and afterward in Italy. He was elected a member of the Academy in 1885 and became professor there in 1889. His work is careful in execution, but often formal and undistinctive. Among examples of it may be cited such imitations of the antique as "Alexander the Great Studying" (1876) and "The Wounded Achilles" (1879), both in the National Gallery at Berlin; "Moses Breaking the Tables of the Law" (1881); a statue of Helmholtz in the grounds of the Berlin University (1899); a fountain commemorative of Heine, intended for Düsseldorf, but which, owing to Nationalist opposition, was finally erected in New York; a statue of William I at Holtenau (1900); the monuments to Bismarck (equestrian), Wiesbaden, and Emperor William I, Potsdam (1901), and various decorations for public structures. Consult Malkowsky, *Ernst Herter* (Berlin, 1906).

HERTFORD, hār'fērd. The capital of Hertfordshire, England, a municipal borough and market town on the Lea, 24 miles north of London by rail (Map: England, F 5). The fourteenth-century church of All Saints, destroyed by fire in 1891, has been replaced by a fine Perpendicular edifice; the shire hall, public library, school of art, an old castle, and a corn exchange are the chief of several important public buildings. The town has a preparatory branch of Christ's Hospital, a grammar school, and several charity schools. It owns the water supply, markets, the public library, and the school of art. Its industries and trade are chiefly agricultural, but it has manufactures of iron and print goods. The old castle, of which traces remain, was built about 905. The present castle is of the time of James I and was the temporary home of Haileybury College when its present buildings were being erected. Domesday Book records Hertford as a borough, and it received its charter in 1544 from Queen Mary. Pop., 1901, 9322; 1911, 10,383.

HERTFORD, WILLIAM SEYMOUR, first MARQUIS OF. See **SEYMOUR.**

HERTFORDSHIRE, hār'fērd-shīr, or HERTS, hār'ts. An inland county of England, bounded on the east by Essex, on the south by Middlesex, on the west by Buckingham and Bedford, and on the north by Cambridge (Map: England, F 5). Area, 632 square miles. Pop., 1901, 258,423; 1911, 311,284. The surface pre-

sents a pleasing succession of finely wooded hill and fertile valley. The chief elevations are those of the chalk downs, a branch of the Chiltern Hills, which skirt the north of the county. The principal rivers are the Lea and the Colne (both affluents of the Thames), the Ivel and the New. Agriculture is the chief industry, over three-fourths of the county being cultivated. Wheat is the staple, and no finer is grown anywhere in England. Immense quantities of hay and straw are sold, and in the southwest there are numerous gardens and orchards, the fruit of which is sent to the London market. Of the great quantities of barley, malt is made. Ware is the chief seat of the malting trade in the kingdom. Paper, straw plait, coaches, and bricks are extensively manufactured. Capital, Hertford.

HERTHA, hēr'tá, **HER'THUS**, **ÆR'THA**, or **ÆR'THUS**. A deity of the ancient Germans. Tacitus (*Germania*, 40) states that she was worshiped with great solemnity by the Suevi (q.v.), and that her temple stood on an island of the ocean, where her service was performed by a single priest. He identifies her with Mother Earth. On great occasions, which were regulated by this priest, the covered chariot of the goddess was drawn forth from the sanctuary by sacred cows and led in triumph throughout the country. Those districts through which the chariot passed were held to be peculiarly favored, peace was always proclaimed in them, and the occasion celebrated by universal merry-making, until the priest declared that it was the will of the goddess to return to her shrine. The car, the vestments that covered the car, and some symbol of the goddess were then purified in a secluded spring; the slaves who performed the ceremony of ablution were swallowed up by the lake. These rites resemble those of the Great Mother of the Gods. (See CYBELE.) The island of Rügen was long thought to be identical with the sacred island of Hertha, but the same honor has been claimed for Helgoland and Zetland, for Alsen, off the eastern coast of Schleswig, and for the site of Hamburg, which some believe to have been formerly an island. See the editors on Tacitus (*Germania*, 40).

HERTLING, GEORG, BARON VON (1843-). A German administrator and Catholic philosopher. He was born in Darmstadt and was educated at Münster, Munich, Berlin, and at Bonn, where he became professor extraordinary in 1880 and in 1882 regular professor. In 1876 he founded the Görres-Gesellschaft and became its president. He was made a lifelong member of the Bavarian Chamber of the Reichsrat in 1891 and was leader of the Centre in the Imperial Diet from 1876 until 1912, when he became Bavarian Foreign Minister and cabinet President. He wrote: *Albertus Magnus* (1880); *John Locke und die Schule von Cambridge* (1892); *Naturrecht und Sozialpolitik* (1893); *Augustin* (1902; 3d ed., 1904). Consult Schindele, "Georg, Freiherr von Hertling als Philosoph," in *Historisch-politische Blätter für das katholische Deutschland*, vol. clii (Munich, 1913).

HERTOGENBOSCH, hēr-tō'gen-bōs', or **HERZOGENBOSCH**. The capital of the Dutch Province of North Brabant. See BOIS-LE-DUC.

HERTS. See HERTFORDSHIRE.

HERTWIG, hért'vīk, OSCAR (1849-). A German embryologist, born at Friedberg. He studied medicine in Jena under Haeckel and

Gegenbaur and at Zurich and Bonn. In 1878 he was made professor at Jena and in 1888 professor of anatomy in Berlin, where he was also rector in 1904-05. He studied with Haeckel and with his brother, Richard Hertwig, at Lesina on the Adriatic in 1871, in Corsica and Villefranche in 1875, and afterward with his brother in Messina and Naples. One of the most influential embryologists of his time, his most important publications include: *Beiträge zur Kenntnis der Bildung, Befruchtung und Theilung des tierischen Eies* (1876), an epoch-making work, because it established the fact that fertilization consists of the conjugation of the two equivalent sexual cells; *Studien zur Blättertheorie* (1879-83), with R. Hertwig; *Die Öölontheorie: Versuch einer Erklärung des mittleren Keimblattes* (1881), with R. Hertwig; *Entwicklung des mittleren Keimblattes der Wirbelthiere* (1883), with R. Hertwig; *Das Problem der Befruchtung und der Isotropie des Eies, eine Theorie der Vererbung* (1884); *Vergleich der Ei- und Samenbildung bei Nematoden* (1890); *Lehrbuch der Entwicklungsgeschichte des Menschen und der Wirbelthiere* (1886; 9th ed., 1910; trans. as *Text-Book of Embryology*, 1892); *Die Zelle und die Gewebe* (1892, 1898); *Ueber den Werth der ersten Furchungszellen für die Organbildung des Embryos* (1893); *Zeit und Streitfragen der Biologie* (1894); *Der Kampf und Kernfragen der Entwicklungs- und Vererbungslehre* (1909); *Die Elemente der Entwicklungslehre des Menschen und der Wirbeltiere* (4th ed., 1910); *Die Radiumkrankheit tierischer Keimzellen* (1911); *Allgemeine Biologie* (4th ed., 1912). He was editor and contributor to the *Handbuch der vergleichenden und experimentellen Entwicklungslehre der Wirbelthiere* from 1901 to 1906.

HERTWIG, RICHARD (1850-). A German zoölogist, born at Friedberg. He studied medicine in Jena under Haeckel and Gegenbaur and also in Zurich and Bonn. In 1874 he became privatdocent and in 1881 professor extraordinarius in Jena. He was made professor of zoölogy in 1881 at Königsberg and in 1885 at Munich. He studied with his brother, Oscar Hertwig, and with Haeckel on the Adriatic at Lesina in 1871 and in Corsica and Villefranche in 1875 and later with his brother in Messina and Naples. His publications include: *Zur Histologie der Radiolarien* (1876); *Studien zur Blättertheorie* (1879-83), with O. Hertwig; *Die Öölontheorie: Versuch einer Erklärung des mittleren Keimblattes* (1881), with O. Hertwig; *Die Aktinien der Challenger Expedition* (1882); *Ueber Kernstruktur und ihre Bedeutung für Zelltheilung und Befruchtung* (1888); *Ueber die Konjugation der Infusorien* (1889); *Ueber Befruchtung und Conjugation* (1892); *Lehrbuch der Zoologie* (1893; 10th ed., 1911); *Kerntheilung, Richtungskörperbildung und Befruchtung von Actinosphaerium Eichhorni* (1898); *Ueber physiologische Degeneration* (1904).

HERTZ, herts, ALFRED (1872-). A distinguished German conductor. He was born in Frankfurt and was educated at the Gymnasium and at the Raff Conservatory. His career as conductor began in 1892 at Altenburg, and he held positions at Elberfeld and Breslau. In 1902 he became first conductor at the Metropolitan Opera House (New York), where in 1903 he attracted the attention of the musical world through his excellent performances of *Parsifal* (the first outside of Bayreuth). Although one of the finest interpreters of Wagner, he never

conducted at Bayreuth because the Wagner family always resented his "desecration" of *Parsifal*. In 1914 he married the concert singer Lilli Dorn of Vienna.

HERTZ, HEINRICH (1857-94). A German physicist, born at Hamburg. He studied at first to become a civil engineer, but forsook this profession for the study of mathematics and pure science, which he pursued at Munich and Berlin, becoming Helmholtz's assistant at the latter university in 1880. In 1883 Hertz became privatdocent at Kiel and two years later was called to the Polytechnic Institute at Karlsruhe as professor of physics. His earlier experiments with electromagnetic waves were performed during his occupancy of this professorship and made for Hertz such a reputation that he was in 1889 called to the important chair of physics at Bonn, previously occupied by Clausius. To Hertz are due the realization and detection of the electromagnetic waves which Maxwell had discovered in his theoretical consideration of the nature of electricity. Hertz found that waves produced by the spark of an electrical machine could be received by a circular loop of wire and was able to show the reflection, refraction, diffraction, and polarization of the waves. The first paper describing these wonderful discoveries was published in 1887, and the series continued for several years in *Wiedemann's Annalen*. In 1890 was published *Ueber die Beziehungen zwischen Licht und Electricität*, while his *Gesammelte Werke* were published in Leipzig the year after his death. English translations entitled *Electric Waves*, by D. E. Jones, with a preface by Lord Kelvin (1893), and *Miscellaneous Papers*, by D. E. Jones and G. A. Schott, with an introduction by Philipp Lenard (1896), have been published. Consult H. Bonfort, *Sketch of Heinrich Hertz*, published by Smithsonian Institution (Washington, 1896). See WAVES; WIRELESS TELEGRAPHY.

HERTZ, HENRIK (1797-1870). A Danish dramatist, born in Copenhagen. A Jew, early orphaned, afterward Christianized and brought up in a literary atmosphere for the law, he abandoned this gradually for the drama (*Mr. Burchardt and his Family*, 1827; *Love and Police*; *The Moving Day*, 1828; *Amor's Strokes of Genius*, 1830), and for satiric criticism in *Baggesen's vein* (*Letters of a Ghost, or Poetic Epistles from Paradise*, 1830). Continuing dramatic work, Hertz fell into the romantic movement in *Svend Dyring's House* (1837) and gained cosmopolitan recognition for *King René's Daughter* (1845), a charming bit of Provençal chivalric romance from the last "Court of Love" (trans. by Theodore Martin). A tragedy, *Ninon* (1848), is also noteworthy. He was also an editor and poet. His *Dramas* are collected in 18 volumes (1854-73), his *Poems* in four (1851-62).

HERTZ, JOSEPH HERMAN (1872-). A Hebrew theologian, born in Rebrin, Hungary, and educated at the College of the City of New York, at Columbia University, and at the University of the Cape of Good Hope. He was rabbi at Syracuse, N. Y., in 1894-98, at Johannesburg in 1898-1911, and in New York City (Congregation Chayim) in 1912, and in 1913 became chief rabbi of the United Hebrew Congregations of the British Empire. Besides sermons and contributions to the new Jewish version of the Bible and to the *Jewish Encyclopedia*, he wrote *The Ethical System of James*

Martineau (1894) and *The Jew in South Africa* (1905).

HERTZ, MARTIN JULIUS (1818-95). A German classical scholar. He was born at Hamburg and after studying at Berlin and Bonn was appointed professor of classical philology at Greifswald in 1855. He was called to a similar chair at Breslau in 1862 and remained there until 1893, when he retired. He is celebrated chiefly for his text edition (1853; 2d ed., 1886) and his great critical edition (1883-85) of Aulus Gellius (q.v.), and for various monographs on that author. Of his other works, the best known are *Karl Lachmann: Eine Biographie* (1851); a critical edition (the standard text) of Priscian's *Institutiones Grammaticae* in Keil's *Grammatici Latini*, vols. ii and iii (1855-59); and his recensions of Livy (4 vols., 1857-63) and of Horace (1892).

HERTZ, WILHELM (1835-1902). A German poet, born in Stuttgart. He studied at Tübingen, and during residence there he was encouraged in Germanic researches by Uhland and wrote the major portion of his *Gedichte* (1859). In 1858 he became a member of the so-called "Munich school" of poets that numbered Lingg, Heyse, Geibel—to whose *Dichterbuch* (1862) he was an original contributor—Bodenstedt, and others. From 1869 until his death he was professor of German language and literature in the Munich Polytechnic School. His intention was directed notably to rendering into the modern language the Middle High German poets, of whose thought and spirit he was a skillful interpreter. He made a brilliant adaptation of *Tristan and Isolde*, supplementing Gottfried with the fragments of the troubadour Thomas (1877; 4th ed., 1904); but his translation of Wolfram's *Parzival* (1898) is not so successful. The epic *Lanzelet und Ginevra* (1860; done into English by Bruce, London, 1865) and the collection *Gesammelte Dichtungen* (1900; 2d ed., 1904) comprise his chief original verse. He wrote also: *Der Werwolf* (1862); *Deutsche Sage im Elsass* (1872); *Aristoteles in den Alexanderdichtungen des Mittelalters* (1890); and others.

HERTZBERG, HERTSBERK, EWALD FRIEDRICH, COUNT (1725-95). A Prussian statesman and historian, born at Lottin, near Neustettin. He studied history and the classics at Stettin and received his doctor of laws degree from Halle in 1745. Two years later he entered the state service and by 1763 had become Chief Minister in the Foreign Office. During the Seven Years' War he supported the policies of Frederick the Great—the chief of his literary works, *Mémoire raisonné* (1756), based on dispatches between the courts of Vienna and Dresden, justifies the Prussian invasion of Saxony; and he was a strong supporter of Frederick's idea of a *Fürstentbund* (q.v.) to offset the encroachments of Austria. It was largely through his efforts that the Peace of Hubertsburg (Feb. 15, 1763) was consummated. His last public act under Frederick the Great was to sign a commercial treaty in 1785 with the United States. Hertzberg at first was received with favor by Frederick William II, who succeeded to the throne in 1786. The policy followed was based on bitter hatred for the house of Hapsburg and strong opposition to the new democratic principles of the French Revolution. But gradually Hertzberg's popularity declined, because of his efforts to use diplomatic means when the King favored war; and he was dismissed in July, 1791, be-

cause of open criticism of the King's foreign policy. His literary work after 1786, in connection with the Berlin Academy, was of great importance. It consisted largely of reports on statistics, history, and political science.

HERTZBERG, hër'ts'bërk, GUSTAV FRIEDRICH (1826-1907). A German historian and archaeologist. He was born at Halle and from 1843 to 1848 studied in the university there and at Leipzig. He became privatdocent of history at Halle in 1851 and taught also in a Gymnasium until 1855. In 1858 he became editor of the *Preussisches Wochenblatt*. In 1860 he was appointed professor of history at Halle. Among his writings are: *Alkibiades, der Staatsmann und Feldherr* (1853); *Das Leben des Königs Agesilaos II. von Sparta* (1856); *Geschichte Griechenlands unter der Herrschaft der Römer* (1866-75); *Geschichte der Perserkriege nach den Quellen erzählt* (1877); *Geschichte Griechenlands vom Absterben des antiken Lebens bis zur Gegenwart* (1876-79); *Rom und König Pyrrhos* (1871); *Die Feldzüge der Römer in Deutschland* (1872); *Geschichte von Hellas und Rom* (1879-80); *Geschichte des römischen Kaiserreichs* (1880-82); *Geschichte der byzantinischen und des osmanischen Reichs* (1882-84); *Geschichte der Stadt Halle* (1889-93); *Kurze Uebersicht über die Geschichte der Universität Halle* (1894).

HERTZIAN WAVES. See WAVES; WIRELESS TELEGRAPHY.

HERTZKA, hër'ts'kà, THEODOR (1845-). An Austrian political economist, born at Pest. He studied at Vienna and at Pest, was editor of the economics section of the *Neue Freie Presse* of Vienna from 1872 to 1879, and in the latter year established the *Wiener Allgemeine Zeitung*, which he edited until 1886. His earlier volumes, such as *Die Gesetze der Handels- und Socialpolitik* (1880) and *Das Wesen der Geldes* (1887), recommend for Austria free trade and a gold-standard currency. In his *Gesetze der sozialen Entwicklung* (1886) he promulgated ideas of social reform which he extended in *Freiland, ein soziales Zukunftsbild* (1890; 10th ed., 1896), the description of a communistic Utopia located in Central Africa. His summons to the formation of such a colony resulted in the organization of nearly 1000 unions for the realization of that object, general direction of the enterprise being assigned to a central committee. An attempt towards the execution of the plans was made in 1893, but failed. The *Reise nach Freiland* (1893; Nos. 3051-62 of Reclam's *Universalbibliothek*) was an amplification by Hertzka of the previous volume. His *Entrückt in die Zukunft* (1895) is especially important.

HERTZOG, hër'ts'óc, J. B. M. (?-). A South African general, leader of the Old Boer element. In 1907-10 he was Attorney-General and Director of Education in the Orange River Colony. Uncompromising in his insistence that Dutch as well as English be taught in the schools, his policy in this regard met bitter opposition. He was appointed Minister of Justice in the Union of South Africa in 1910 and continued in office until December, 1912, when his antagonism to imperialism and to Premier Botha led to a ministerial crisis. In 1913 he led a secession of the Old Boer and anti-imperialist section from the South African party. See SOUTH AFRICA; UNION OF, *History*.

HERULI, hër'q-lì, or **ERULI**, ër'q-lì. A

savage, undisciplined, and warlike tribe of Germanic stock that appears frequently in history from the third to the sixth century A.D. We first hear of them as settled north of the Black Sea at about the middle of the third century and joining in the marauding expeditions of the Goths (q.v.) on the eastern confines of the Roman Empire, on the coasts of the Black Sea and the Ægean. They even captured Athens in 262 A.D. (See DEXIPPUS, PUBLIUS HERENNUS.) In the following century they were subjugated by Hermanrich, King of the Ostrogoths, and later still allied themselves with the Huns and fought in the battles of Attila. (See ATTILA.) By this time their main body had moved to the west and was settled in the middle basin of the Danube in close proximity to the Gepidæ, with whom they formed a sort of loose alliance. They joined in large numbers the army of Odoacer (q.v.) and helped to overthrow the Western Empire in 476. Their Danubian kingdom was destroyed by the Lombards in the sixth century, and the race was dispersed, soon disappearing from view. Most of them had been converted to Christianity under the Emperor Justinian. Consult: Aschbach, *Geschichte der Heruler und Gepiden* (Frankfurt, 1835); Thomas Hodgkin, *Italy and her Invaders*, vol. ii (Oxford, 1892); Pasquale Villari, *Barbarian Invasions of Italy* (2 vols., New York, 1903).

HERVAS Y PANDURO, ár-vàs' é pán-doo'rò, LORENZO (1735-1809). A Jesuit priest and celebrated philologist, born at Horecajo de Santiago (Cuenca), Spain. He entered the Society of Jesus at Madrid in 1745; studied in the Jesuit College at Alcalá de Henares, devoting himself especially to linguistics and architecture; taught in the Royal College in Madrid and at Murcia in the college of his order. Soon after he went to America as a missionary, but in 1767, by the expulsion of his society, he was driven to Rome, where he studied mathematics, physics, and afterward linguistics. In 1799 he returned to Barcelona and after a few months to his native town. But in 1803 or 1804 he again went to Rome, and Pius VII made him librarian of the Quirinal, where hard work hastened his death. He may be called the founder of comparative philology in Spain and Italy, because of his *Catálogo de las lenguas conocidas* (6 vols., 1800-05), in which he studied the characteristics of more than 300 languages and attempted to classify them; the *Vocabulario poliglota* (1787); an *Ensayo práctico de las lenguas* (1787); and *Origen, formación, mecanismo, y armonía de los idiomas* (1785). He wrote both in Italian and Spanish. His most famous work was *Idea del Universo* (21 vols., 1778-87), a huge treatise on cosmography. He wrote: *La escuela española de sordo-mudos ó arte para enseñarles á escribir y hablar el idioma español* (2 vols., 1795-99), which was followed by other educational works for deaf-mutes; *Descripción de los archivos de la corona de Aragón en Barcelona, etc.* (1801); and the following unedited works: *Historia de la escritura; Paleografía universal*, with alphabets of a great number of languages; *Moral de Confucio; Historia de las primeras colonias de América*.

HERVÉ, ár'vè', AIMÉ MARIE EDOUARD (1835-99). A French journalist, born at Saint-Denis, Réunion Island. He was successively editor of the *Courrier du Dimanche* (1863), *Le Temps* (1864), *L'Époque* (1865); after which the gov-

ernment censorship silenced him in France till in 1867 he, with J. J. Weiss, founded *Le Journal de Paris*. On Weiss's withdrawal he edited that paper alone until 1873, when he founded *Soleil*, which he conducted with great ability. He was elected to the Academy in 1886. Hervé was a supporter of a liberal constitutional monarchy and wrote in this connection a history of liberal ideas in England, *Une page d'histoire contemporaine* (1869). Consult Avenel, *Histoire de la presse française* (Paris, 1900).

HERVÉ (properly FLORIMOND RONGER) (1825-92). A French musical composer, librettist, and comedian. He was born at Houdain, near Arras, went to Paris when a child, studied vocal and instrumental music under Saint-Roch, and was for eight years organist of Saint-Eustache. He made his début as a composer with a light opera, *Don Quichotte* (1848), and in 1851 was made leader of the Palais-Royal orchestra. Three years afterward he assumed the direction of the Folies-concertantes on the Temple Boulevard and became literally man of all work, as he wrote the score and the words, delivered both, led the orchestra, painted and shifted scenery. His first great success was in his original rôle of *Le compositeur toqué*, and he produced a number of light operas, such as *L'Œil crevé* (1867) and *Le petit Faust* (1869), performances not lacking in melody, imagination, and originality. Hervé was the originator of French opera bouffe, but his work was afterward overshadowed by that of Offenbach.

HERVÉ, GUSTAVE (1871-). A Radical French Socialist leader, born near Brest. The publication of antimilitarist articles in 1901 cost him his position as professor of history in the lycée of Sens. In 1905, and often thereafter, he was imprisoned for inciting opposition to compulsory military service, but popular agitation, led by Anatole France, Octave Mirbeau, and Jean Jaurès, was stronger than the courts. For a time he practiced law, but in 1903, for an article on national brigandage in Morocco, he was disbarred. His editorial defense of a man who had killed a gendarme, with a revelation of the methods of the Paris police, in 1910 brought Hervé a sentence (not carried out) to four years at hard labor for "inciting to murder." As editor of *La Guerre Sociale* (founded 1905), he voiced his antinational views, which he claimed were not anarchistic, encouraged strikes among workmen, and refused to condemn sabotage. His book *Leur patrie* (in English, *My Country, Right or Wrong*, 1910) attacks organized government as the foe of labor; yet in 1914, when France was drawn into the European War, like other Socialists he laid down his antagonism and supported the national cause. See SOCIALISM; MILITARISM.

HERVÉ RIEL, *âr'vâ' rê-êl'*. The hero of Browning's poem of the same name (1867).

HERVEY, JOHN, LORD HERVEY OF ICKWORTH (1696-1743). An English politician, the eldest son of John, first Earl of Bristol. He was educated at Westminster and at Cambridge and afterward traveled on the Continent. After his return he frequented the court of the Prince of Wales at Richmond and in 1720 married Mary Lepell, maid of honor to the Princess. He entered the House of Commons in 1727 as member for Bury St. Edmunds and at first opposed Walpole, though he was brought over by a pension, the office of vice chamberlain (1730), and a seat in the House of Lords (1733). In 1740

he succeeded Lord Godolphin as Lord Privy Seal and held this office until Walpole's fall from power in 1742.

Hervey was an intimate friend of the Queen and in spite of miserable health continued to take an active part in politics until his death. He was a man of doubtful morals and no religion, but intellectually by no means justified Pope's bitter epithets of Lord "Fanny," "Sporus," and "Narcissus." The wordy quarrel between Hervey and the poet was probably concerning Lady Mary Wortley Montagu, to whom the former was friendly for many years. During his political career Hervey wrote a number of vigorous controversial pamphlets, and in 1778 the Rector of Ickworth published a volume of *Letters between Lord Hervey and Dr. Middleton Concerning the Roman Senate*. His *Memoirs* were not published until 1848. They are ably written, in a cynical style throughout, and contain valuable information about the inner court life of his time.

HERVEY, WALTER LOWRIE (1862-). An American educator, born at Mount Vernon, Ohio. In 1886 he graduated from Princeton University (Ph.D., 1892). After teaching Latin and Greek in secondary schools for three years he was connected with Teachers College, New York (later part of Columbia University), as professor of the history and institutes of education, dean of the faculty (1889-91), acting president (1891-92), and president (1892-97). In 1898 he became a member of the board of examiners of the department of education of New York City. He also served as dean of the Chautauqua School of Pedagogy (1894-99) and as a member of the National Council of Education. He edited the *Horace Mann Readers*, lectured and wrote articles on education, and is author of *Picture Work* (1896), *Daily Lesson Plans* (1912), and *Introductory Second Reader* (1914).

HERVEY DE SAINT-DENYS, *âr'vâ' de sâ'n'-de-nê'*, MARIE JEAN LÉON, MARQUIS D' (1823-92). A French historian and Orientalist, born in Paris. He studied Eastern languages in the College of France, and in 1867 was appointed commissioner general for China at the Universal Exposition at Paris in 1867. He had for years devoted himself especially to the study of Chinese and in 1874 was made professor of that language at the College of France and four years afterward was elected a member of the Académie des Inscriptions et Belles-Lettres. His first works were the outcome of an interest in Spanish literature—*Le poël de la prairie* (1847), a translation of a Spanish comedy, and *Histoire du théâtre en Espagne* (1850); but his great service to literature lay in his writings about China and his translations from the Chinese, notably: *Recherches sur l'agriculture des Chinois* (1850); *Poésies de l'époque des T'ang* (1862), translations; *Li-Sao: poème du III^e siècle avant notre ère* (1870), a translation; *Trois nouvelles chinoises* (1885); *Mémoire sur les doctrines religieuses de Confucius* (1887); *Six nouvelles nouvelles* (1892), translations.

HERVEY ISLANDS. See COOK ISLANDS.

HERVIEU, *âr'vyê'*, PAUL ERNEST (1857-1915). A French author, born at Neuilly-sur-Seine. He studied at the Lycée Condorcet, was admitted to the bar in 1877, and in 1879 became connected with the Secretary's office of the presidency of the Council. In 1881 he was appointed Secretary to the French Legation in Mexico, from which post he resigned in the same year. He con-

tributed to numerous periodicals. He afterward collected a series of essays, first published in the *Gaulois*, as *La bêtise parisienne* (1884). His books, involved in manner, but marked by skillful character drawing, include: *Les yeux verts et les yeux bleus* (1886); *L'Inconnu* (1887); *Deux plaisanteries* (1888); *L'Écorisée* (1891); *Peints par eux-mêmes* (1893); *L'Armature* (1895), dramatized in 1905 by Eugène Brieux; *Le petit duo* (1896); *Amitié* (1900). Among his dramas are: *Les tenailles* (1894); *La loi de l'homme* (1897); *La course du flambeau* (1900); *L'Enigme* (1901); *Théroigne de Méricourt* (1902); *Le dédale* (1902), given in New York as *The Labyrinth*; *Le réveil* (1905); *Bagatelles* (1912). In 1900 he was elected to the French Academy, and he became an Officer of the Legion of Honor and honorary president of the Society of Dramatic Authors and of the Society of Men of Letters.

HERVIEUX, ār'vyé', LÉOPOLD (1831-1900). A French advocate and author. He was born at Elbeuf, was educated at the Lyceum of Rouen, and studied law in Paris, where he afterward had some important cases. He was elected municipal councilor for the Saint-Vincent de Paul District in 1884 and retired to private life in 1890. Between 1860 and 1870 he wrote under the nom de plume "Saint-Amand." His writings include: *Premiers essais poétiques* (1853); *Mémoires d'une femme du monde* (1860); *Poésies complètes* (1866); *Théâtre complet* (1867); *Les déclassés* (1882); *Le forçat ou la nécessité du divorce* (1880); *Harmonies intimes* (1889); *Étapes amoureuses d'un sonnetiste* (1889); *Des péculs du fils de famille dans la législation romaine* (1890); *Phèdre et ses imitateurs* (1884-93), perhaps his most notable work; *Les fabulistes latins* (1884-94).

HERVILLY, ār've'yé', ERNEST-MARIE D' (1839-1911). A French poet, romancer, and playwright, born in Paris. He was educated for civil engineering, but left his railroad appointment and his overseeing of bridges and highways to go into journalism. Thence he emerged as a poet with such work as *La lanterne en vers de couleur* (1868), *Les baisers* (1872), *Le harem* (1874), and *Bêtes à Paris* (1886), while he made his name as a novelist with *Mesdames les parisiennes* (1875) and *La dame d'Entremont* (1884), after which he wrote acceptably for young people—*Les aventures d'un petit garçon préhistorique en France* (1887) and *Jack-le-Gal et ses contes* (1891), for example. Essays, tales, and fantasies of his in prose have been collected under the titles *Contes pour les grandes personnes* (1874), *Histoires divertissantes* (1876), etc. He wrote also a number of one-act comedies in verse that have met with favorable receptions, such as *Le magister* at the Théâtre Français, *Le bibelot* at the Palais-Royal in 1877, and *Molière en prison* at the Odéon, 1886. In 1892 appeared his *Notre ami Droléon*.

HERWARTH VON BITTENFELD, hër-värt fön bit'ten-felt, KARL EBERHARD (1796-1884). A Prussian general. He was born at Grosswerther in Prussia, and entered the army in 1811. He gained his first laurels in the War of Liberation (1813-15), especially in the battle of Leipzig. In 1848 he commanded the First Regiment of the Guards. During the war with Denmark in 1864 he acquired fame through his daring crossing of the Sound and capture of the Isle of Alsén. In the campaign of 1866 he was in command of the right wing of the army

which advanced into Bohemia through Saxony. He bore the brunt of the fighting at Hühnerwasser and Münchengrätz and contributed materially to the victory of Sadowa. On the outbreak of the War of 1870 he was appointed Governor of the Rhenish Provinces, and in the next year he was raised to the rank of general field marshal.

HERWEGH, hër'vāk, GEORG (1817-75). A German poet. He was born at Stuttgart; was educated there, at Maulbronn, and at the theological seminary at Tübingen; forsook theology, which he had begun to study, for literature; and returned to Stuttgart, where he coöperated in Lewald's *Europa*. In 1841 he was living in Switzerland and published *Gedichte eines Lebendigen* (last ed., 1896; named in contrast to Pückler's *Briefe eines Verstorbenen*), political poetry full of the unrest, the dissatisfaction with the existing conditions, and the uncertainty as to what would take its place, that marked the period. These fervent effusions became immensely popular, so that when, after a short trip to Paris, Herwegh journeyed through Germany in 1842, he was greeted with enthusiasm everywhere. King Friedrich Wilhelm IV gave him an audience and assured him that he liked a thoughtful opposition. But the young man lost his head and overstepped all the bounds of conventionality in a letter to the King in December, 1842, and was hurried out of Prussia. At Zurich he found no pleasant reception; he married a rich Jewess and took up his abode in Paris, where he wrote a second volume of *Gedichte eines Lebendigen* (1844). In this republican tendencies were more plain than ever, but his inspiration seemed weaker. He translated all of Lamartine into German (1843-44). After the revolution of February, 1848, Herwegh made several attempts to carry out his republican ideas by invading Baden at the head of a legion of German and French workingmen, but was defeated by the Württemberg troops and escaped only through the bravery of his wife. Thereafter he lived in retirement in Paris and later in Zurich, at Lichtenthal, near Baden-Baden, and at Liestal, near Basel. The most important work of his later years was the translation of many of Shakespeare's plays. Consult Marcel Herwegh (his son), *Briefe von und an Georg Herwegh* (Zurich, 1896).

HERZ, härts, HENRI (1806-88). A French pianist, born in Vienna. He studied music under Hüntén at Coblenz and at the Paris Conservatory, where he won first prize for piano playing. He made a number of tours which were highly successful—in Germany, with the violinist Lafont (1831); in London, appearing with Moscheles and Cramer (1834); in the United States, Mexico, and the West Indies (1845-51). From 1842 to 1874 he was professor of piano playing at the Paris Conservatory. He founded a piano factory, and in 1855 his instruments received first prize at the Paris Exhibition. Herz's compositions were confessedly written to catch the popular fancy, and are forgotten to-day. But during the decade 1825-35 he was regarded as the world's greatest pianist. He published *Mes voyages en Amérique* (1866), a series of letters describing his American tour.

HERZ, HENRIETTE (1764-1847). A German woman, distinguished for her rare beauty and culture as well as by her relations to many of the most distinguished men of her time. She was born in Berlin, the daughter of a Jewish

physician, Benjamin de Lamos, and at 15 years of age became the wife of Markus Herz, a rich and elderly physician. Her home became the centre of the literary life of Berlin, especially after her conversion to Christianity in 1817; and such men as the Humboldts, Friedrich and August Wilhelm Schlegel, Fichte, Varnhagen von Ense and his wife Rahel, Schleiermacher, and Börne were her intimate friends. She became a widow in 1803. Most of her letters from the distinguished people of her day she burned. Consult Fürst, *Henriette Hers: Ihr Leben und ihre Erinnerungen* (Berlin, 1850); Ludwig Geiger, *Briefwechsel des jungen Borne und der Henriette Hers* (Oldenburg, 1905); *Schleiermacher und seine Leben nach Briefen der H. H.* (Leipzig, 1910).

HERZEGOVINA, hěrt'sā-gō-vě'nā. The smaller of the two territories of Austria-Hungary prior to October, 1908, belonging to Turkey, but virtually an Austro-Hungarian protectorate, in accordance with the Treaty of 1878 (Map: Austria-Hungary, F 5). It is bounded by Bosnia proper on the north, by Montenegro on the east, and Dalmatia on the southwest. Its area is 3528.5 square miles. In the formation of its surface it resembles Bosnia (q.v.). It is generally somewhat barren and is mountainous, having a number of peaks exceeding 7000 feet in height, the highest being the Maglic on the eastern boundary, which rises about 7850 feet above the sea. The eastern part is especially barren and rocky, in contrast with the part adjoining Bosnia and Dalmatia, which is fertile and invites the cultivation of the vine, tobacco, and southern fruits. In this latter district is found the largest river, the Narenta, whose valley forms the characteristic feature of the region. Administratively the Herzegovina is a dependency of Bosnia and forms the district of Mostar. The population, exclusive of the military, in 1895 was 219,511; in 1910, 267,038 (132,830 males, 134,208 females). Roman Catholics in 1910 numbered 112,149; Serbian Orthodox, 90,712; and Mohammedans, 63,619. The great bulk of the inhabitants are Slavs. The largest town is Mostar (q.v.), which is connected by rail with Sarajevo, the Bosnian capital.

Herzegovina was originally a part of Dalmatia and was occupied by a Slavic population in the seventh century. The most important of the medieval principalities of the region was that of Zachlum, or Chulm, which in the fourteenth century was annexed to Bosnia. Regaining its independence, Herzegovina was erected into a dukedom by the Emperor Frederick III in 1440. (Hence the name "Herzegovina," from Ger. *Herzog*, Slav. *herceg*, duke.) About 1463 the country became tributary to the Turks and 20 years later was completely subject to them, remaining for more than two centuries afterward a battlefield between Christians and Mohammedans. In 1875 a serious insurrection, arising from the Turkish oppression of its Christian inhabitants, broke out in Herzegovina, which rapidly spread into Bosnia and was supported by Montenegro and Serbia. This ultimately led to the War of 1877-78 between Russia and Turkey. The Berlin Congress of 1878 determined that Herzegovina, like Bosnia, should be handed over to Austria-Hungary for administration and military occupation. The Mohammedan inhabitants rose against the Austrian army of occupation and were subdued only after a desperate resistance. The introduction of a new recruiting law

was the occasion for an insurrection in 1881-82. In October, 1908, the Austro-Hungarian government, which had done much to promote the welfare of the whole region, formally extended the full sovereignty of Austria-Hungary over Herzegovina as well as Bosnia; and in this practical repudiation of the Treaty of Berlin the Great Powers subsequently acquiesced, despite the loud protests of Serbia. A new constitution was proclaimed in February, 1910, vesting the government of the two provinces jointly in a representative of the Austro-Hungarian Finance Minister at Vienna and a popularly elected Diet at Sarajevo. See BOSNIA.

HERZEN, hěrt'sěn, ALEXANDER IVANOVITCH (1812-70). A Russian publicist and author, born at Moscow. He was the illegitimate child of a rich nobleman, Ivan Alexeévitch Yakovlev. He received the fashionable French education of the time, and while at school became a great admirer of the contemporary French Socialists. Arrested in 1834 with his comrades for his revolutionary sympathies, he was exiled to Perm and then to Viatka, where he held a position in the Governor's office. Transferred to Vladimir, he married, bringing his bride secretly from Moscow. In 1840 he was allowed to return to Moscow. A close study of Hegel and Feuerbach brought him to conclusions quite opposite to those of most of his friends and made him the leader of one school of political philosophers, just as Belinsky (q.v.) was of the other—the school which clung to Hegel's "Whatever is, is right" theory even in the face of Russian despotism and absolutism. Under the influence of the doctrines of Proudhon, Cabot, and Louis Blanc, he became a rabid Westerner as distinguished from the Slavophiles. He resigned his government position in 1842 and left Russia in 1847, after having published, under the pseudonym "Iskander," two works on philosophy as well as several novels. He settled in Paris, was in full sympathy with the events of 1848, although not actively connected with them, and later was on intimate terms with Proudhon, Garibaldi, as well as with many revolutionists in France, Italy, and Switzerland, in a systematic agitation against the absolutist government of Russia. Forced by the police to leave Paris, he was naturalized in Switzerland and, founding a free press in London, published after 1857 his weekly *Kolokol* (The Bell). From 1864 to 1867 he published it at Geneva, moving in 1869 to Paris, where he soon died of pneumonia.

His literary activity began as early as 1830. His works are strikingly brilliant, characterized by depth of thought and artistic form. His best-known novel, *Who Is to Blame?* (1891), deals with the questions of feelings versus reason, family relations, and woman's position in marriage. Its dominant idea is that it is futile to seek happiness by locking one's self up within the narrow family interests away from society and the world. A great admirer of Western civilization, he was completely disappointed in it when viewing it at close range and was disgusted with the *bourgeoisie*. He saw a bright future for the working classes, however, and expected much from the regenerative power of Russia, with her system of village communes. These ideas he embodied in his *Vom andern Ufer* (1850; published in Russian, 1855, in French, 1870) and in his *Letters from France and Italy* (1855), in which he gives a keen analysis

of the causes that brought on the revolutionary events of the time. Herzen was a freethinker in the broadest sense of the word, hence his negative attitude towards all parties and creeds. His influence was overwhelming, the greatest secrets of the state and the Imperial household immediately finding their way into his paper, which was so interesting that even the Emperor read it regularly. But his popularity was undermined by his advocacy of the Polish rebellion, to which he was persuaded by his friend Bakunin (q.v.). The circulation of the *Kolokol* from over 3000 fell to about 500, and Herzen finally stopped its publication.

Besides the works already mentioned, the following are among his best: *Dilettantism in Science* (1842); *Letters on the Study of Nature* (1845-46); *From the Memoirs of Doctor Krupov* (1847); *Recollections of my Travels* (1848); *On the Development of Revolutionary Ideas in Russia* (1851); *Baptized Property* (1853), or "Serfism"; *Prison and Exile* (1854); *My Exile* (1855); *Interrupted Tales* (1856); *France or England* (1858); *The Old World and Russia*, and *The New Phase of Russian Literature* (1864). His collected works in Russian were published at Geneva (1875-85; the latest edition, in 7 vols., at St. Petersburg in 1905). In French his works appeared as follows: *Mémoires*, vols. i-iii (Paris, 1860-62); *Récits et nouvelles* (ib., 1873); *Correspondance de Michel Bakounine: lettres à Herzen et à Ogareff* (ib., 1896). The *Kolokol* articles were collected and published at Brussels in 1863-65, under the title *Cloche*. Consult: Eckhardt, in *Jungrussisch und Altliivländisch* (Leipzig, 1871); Sperber, *Die sozialpolitischen Ideen A. Herzens* (ib., 1894); Bogucharsky, *Al-ewander Ivanovitch Herzen* (St. Petersburg, 1912).

HERZL, hërts'l, THEODOR (1860-1904). Founder of political Zionism (see ZIONIST MOVEMENT), born in Budapest. He studied law, became literary editor of the Vienna *Neue Freie Presse*, and wrote plays, essays, and stories. In 1896 he published *Der Judenstaat*, advocating the establishment of an autonomous Jewish state in Palestine. He soon became the leader of the Zionist movement. In 1897 he brought about the meeting of the first Zionist congress at Basel, over which he presided. In *Alt Neuland* (1902) he depicted the Jewish state as an accomplished fact.

HERZLIEB, hërts'lép, MINNA (1789-1865). A friend of Goethe. She became acquainted with the poet when she was 18 years old, married Professor Walch in Jena in 1826, lived unhappily with him, fell a victim to mental disease, and was placed in a sanitarium. In his *Wahlverwandtschaften* Goethe is supposed to have represented her under the name "Ottilie." Some of Goethe's sonnets refer to her. Consult Gädertz, *Goethes Minchen* (Bremen, 1888).

HERZOG, hër'tsög, EDOUARD (1841-). First Bishop of the Old Catholic church of Switzerland. He was born at Schongau, Switzerland. He studied theology at Tübingen and Freiburg, was ordained priest in the Roman Catholic church (1867), and was professor of exegesis in the theological seminary at Lucerne (1868-72). He resigned his professorship and joined the Old Catholic organization (1872) and was pastor of Old Catholic churches at Krefeld, Germany (1873), and at Olten, Switzerland (1874), and professor of New Testament exegesis in the Old Catholic faculty at the Uni-

versity of Bern. He was called to be Bishop by the national synod in 1876. He wrote extensively, mostly on the problems of the Old Catholic church.

HERZOG, ERNST VON (1834-1911). A German classical philologist, born at Esslingen. He was appointed a professor in the University of Tübingen in 1867. His publications relate chiefly to the constitutional history of Athens and Rome. The most important among them are: *Gallia Narbonensis Historia* (Leipzig, 1864); *Geschichte und System der römischen Staatsverfassung* (ib., 1884-91); *Zur Verwaltungsgeschichte des attischen Staats* (Tübingen, 1897).

HERZOG, HANS (1819-94). A Swiss general, born at Aarau and educated there. He volunteered in the Württemberg artillery in 1846 and in 1860 was appointed by the Federal Council inspector general and colonel of the Swiss artillery. He introduced new arms for both infantry and artillery. At the beginning of the Franco-Prussian War he was put in command of nearly 40,000 men to guard the Swiss frontier. At the beginning of 1871 he entered into a convention with General Clinchant at Verrières by which Bourbaki's army was allowed to cross into Swiss territory on laying down its arms. In 1875, upon being appointed commander in chief, he completely reorganized the artillery. Consult Bluntschli, *Karl Johann Herzog* (Zurich, 1895).

HERZOG, JOHANN JAKOB (1805-82). A religious editor and scholar. He was born at Basel, Sept. 12, 1805. He studied at Basel and Berlin and filled the position of professor of historical theology at Lausanne, Halle, and Erlangen. He retired in 1877 and died at Erlangen, Sept. 30, 1882. He was a voluminous writer and published a sketch of Calvin (1843), a life of Cæcolampadius (1843), works on the Waldenses (1848 and 1853), and *Abriß der gesamten Kirchengeschichte* (1876-87; 2d ed. by Koffmann, 1890-92). His greatest work was the religious encyclopædia known as *Real-Encyclopädie für protestantische Theologie und Kirche* (22 vols., Gotha, 1853-68; 3d ed. by A. Hauck, 1896-1909), of which he was editor and to which he contributed 520 articles. See his life in the *Real-Encyclopädie*, 3d ed., vol. vii.

HERZOG, KARL JOSEPH BENJAMIN (1827-1902). A German statesman, born at Brieg and educated in law at Breslau. He was assistant in the ministerial Department of Commerce (1859) and representative of the North German Federation at the Paris Exposition (1867); in 1871 he was a member of the commission on the government of Alsace and Lorraine, and later (1876) became Assistant Secretary of State in the department for these provinces, and (1879) Secretary of State in their first ministry, from which he resigned a year later because of his opposition to the policy of Von Manteuffel. He traveled in America (1881-82) and wrote *Reisebriefe aus Amerika* (1884). From 1885 until his death he was first a director and then a trustee of the newly organized New Guinea Company.

HERZOG, RUDOLF (1869-). A German novelist, born at Barmen and educated in the schools of his native town. In 1884 he entered a chemical house in Düsseldorf as an apprentice and later worked as an expert in a large paint house in Elberfeld. During the years 1891-93 he studied philosophy in Berlin and in 1894 became literary editor of the fortnightly periodical

called *Schwarz-Rot* in Darmstadt. Three years later he went to Hamburg as editor in chief of the *Hamburger Neue Nachrichten* and then to Berlin as member of the staff of the *Berliner Neue Nachrichten*. He began his literary career with *Vagantlieder* (1892) and tried the drama with varying success. In 1895 he made a decided hit with his excellent novel *Die Wiscottens* (100th ed., 1913), describing the rise of a manufacturer's family and painting charming pictures of the Wuppertal and its people. Among his other works may be mentioned: *Die Condottieri* (1909), drama; *Der alten Sehnsucht Lied* (35th ed., 1913), short story; *Abenteuer* (1907; 45th ed., 1912), novel; *Hanseaten* (1908; 60th ed., 1912), novel; *Es gibt ein Glück* (1910; 70th ed., 1913), short stories; *Die Burgkinder* (1911; 80th ed., 1913), novel; *Herrgottsmusikanten* (2d ed., 1912), comedy; the poems *Wir sterben nicht* (5th ed., 1913); and *Sons of the Rhine* (1914).

HERZOGENBERG, hër'tsô-gen-bêrk', HEINRICH VON (1843-1900). An Austrian musician, born at Graz. He studied at the Vienna Conservatory (1862-64) and in 1874, at Leipzig, founded the Bach-Verein in conjunction with Spitta, Holstein, and Volkland. In 1875 he succeeded the latter as its director. He was professor of composition at the Berlin Hochschule für Musik (1885-92) and also a member of the Academie and director of the Meisterschule for composition and one of the greatest contrapuntists of the century. His compositions include the oratorio *Die Geburt Christi*; a symphonic poem, *Odysseus*; two symphonies; many psalms for chorus and orchestra; and instrumental pieces. Consult W. Altmann, *Heinrich von Herzogenberg* (Leipzig, 1903).

HERZOG ERNST, hër'tsô-êrnst. A poem of the twelfth century, of Bavarian origin, but of unknown authorship. Its subject is the exploits of Ernst of Swabia in the Orient during his banishment. Consult George Voss, *Die Sage vom Herzog Ernst unter dem Einflusse Wolframs von Eschenbach* (Colmar, 1886), and F. A. Ahlgrimm, *Untersuchungen über die Gothaer Handschrift des Herzog Ernst* (Kiel, 1890).

HESEKIEL, hâ-zâ'kê-êl, GEORG LUDWIG (1819-74). A German novelist, born at Halle, the son of Friedrich Hesekei, a religious poet, and educated at Halle, Jena, and Berlin. He was editor of *Die Rosen* at Altenburg (1846), of the *Patriotischer Hausfreund* at Zeitz (1848), of the Berlin *Kreuzzeitung* (1849), and of the *Berliner Revue* (1855); but he is known for his poems and novels, which are marked by a distinctly conservative and monarchical patriotism, but have no great literary worth. Among the former are: *Gedichte eines Royalisten* (1841); *Zwischen Sumpf und Sand* (1863); *Aus dem Danenkrieg* (1864); *Neue Gedichte* (1866); *Gegen die Franzosen* (1870). His novels include: *Das liebe Dorel* (1851); *Vor Jena* (1859); *Von Jena nach Königsberg* (1860); *Stille vor dem Sturm* (1862); *Unter dem Eisenzahn* (1864); *Refugiert und emigriert* (1869); *Graf d'Anethan d'Entragues* (3d ed., 1861); *Von Turgot bis Babeuf* (2d ed., 1873); *Lilienbanner und Tricolore* (1859). *Preussenlieder* (1846 and 1864) is his best work. He also wrote *Das Buch vom Grafen Bismarck* (3d ed., 1873). Consult Theodor Fontane, *Von Zwanzig bis Dreisszig* (Berlin, 1898).

HESEKIEL, LUDOVICA (1847-89). A German novelist, daughter of the preceding, born at Altenburg. She early entered journalism and in

literature devoted herself to historical fiction and to biography. She married Wilhelm Johnsen, pastor at Neustadt, in 1887. Among her novels, which are no better than her father's, the most important are: *Eine brandenburgische Hofjungfer* (1868); *Von Brandenburg zu Bismarck* (1873); *Unterm Sparrenschild* (5th ed., 1903); *Deutsche Träumer* (2d ed., 1897); *Prinz Wilhelm* (2d ed., 1897); *Jesus meine Zuversicht* (3d ed., 1894); *Des Kaisers Gast* (3d ed., 1894); *Andernach und Clairveaux* (1889). She also wrote the sketches *Barackenleben* (1872) and the biographies, *Elisabeth Luise* (1881), *Agnes Fürstin Reuss jüngerer Linie* (1887), and *Augusta, Kaiserin-Königin* (1890).

HESILRIGE, hêz'el-rig, or **HA'ZLERIGG**, SIR ARTHUR (?-1661). An English statesman, member of the Long Parliament, and one of the famous Five impeached by King Charles. He took an active part in the Civil War as commander of a regiment of horse called "The Lobsters" by the Royalists and was equally prominent in Cromwell's Parliament, but opposed to the protectorate. Ultimately he voted for the restoration of the Stuarts, though too late in so doing to save more than his life, for he died in the Tower.

HE'SIOD (Gk. 'Hēsiōdos, Hēsiodos). After Homer, the earliest Greek poet whose works have survived. The date at which he lived is uncertain. Herodotus regarded him as contemporary with Homer and dated both of them 400 years before his own day, i.e., in the middle of the ninth century B.C. Ephorus (q.v.) thought him older than Homer; the Parian Chronicle (q.v.) also takes this view and makes him 30 years the elder; but the Alexandrian scholars, Eratosthenes and Aristarchus, held that the treatment of the myths and the geographical knowledge shown in Hesiod's works proved him to be younger than Homer. Modern criticism has shown clearly that the Hesiodic works exhibit a knowledge of the *Iliad* and the *Odyssey* in their present Ionic dialect and in very much their present form; on the other hand, it is certain that Hesiod's *Works and Days* was known to Simonides and Archilochus, so that we may safely place Hesiod in the second half of the eighth century, or perhaps about 700 B.C.

Our knowledge of his life is derived almost solely from his poems; the ancient scholars had no better source of information. Notices in his *Works and Days* and other scattered sources seem to show that his father, under stress of poverty, came to Boeotia as an emigrant from Cyme, an Æolian town in Asia Minor, and settled in the petty village of Ascra beneath Mount Helicon. Here probably Hesiod was born. In his youth he watched the sheep on Helicon. At his father's death his brother Perses succeeded in cheating him of his proper inheritance by corrupting the judges; but later this unjust brother was reduced to such poverty that he was forced to appeal for aid to Hesiod. (For a careful discussion of this common version of Hesiod's life, consult the Introduction to Mair's translation of Hesiod, Oxford, 1908.) Under the impulse of his homely muse, Hesiod, like other early bards, became a wandering singer, visiting not simply the cities of his native Boeotia, but also traveling to the west past Delphi, until he reached Naupactus in Ozolian Locris. Tradition says that the Delphic oracle had warned him that he was destined to die in the shrine of the

Nemean Zeus; but the poet in the course of his travels came to Ceneon in Locris, quite unaware that here also was a temple of the god whose sacred precinct he was to avoid. In this town he is reported to have met his death at the hands of two brothers who without foundation suspected him of wronging their sister. The tradition may well have this truth, that Hesiod died in Locris. At Naupactus a school of Hesiodic poetry developed, one product of which was the genealogical poem *Ναυπάκτια*, fragments of which are embodied in the scholia to Apollonius Rhodius. In later times a grave of Hesiod was to be seen in the market place at Orchomenus, to which tradition said the poet's bones had been removed at the command of the Delphic oracle.

Hesiod was the founder of Greek didactic poetry (q.v.), as Homer was of epic song. In form Hesiod's poetry was throughout epic, because it used the hexameter verse. The following works are extant under his name: *Works and Days* (*Ἔργα καὶ Ἡμέραι*), in 828 verses, which the Boeotian tradition current on Mount Helicon (q.v.) regarded as his only genuine work. The first part of its name (*Works*) comes from the directions for various kinds of labor, especially farm labor, which it contains; the second (*Days*) is due to the calendar it gives, showing the days of the month on which certain tasks should be performed. The poem in its present form no doubt contains some later additions, but scholars are not agreed about the extent of these interpolations. The *Theogony* (*Θεογονία*), in 1022 verses, is an attempt to bring Greek mythology into an ordered system and to incorporate into the ranks of the older divinities the new gods from abroad, who were not known to the Homeric poems. In it theosophic and cosmogonic speculations are combined with ancient hymns and accounts of cults. Under the epic form Hesiod gives a history of the creation and of the generations of the gods; the close of the poem contains a list of the daughters of Zeus who bore sons to mortals. We have to regret the loss of the *Catalogue of Women* (*Γυναικῶν Κατάλογος*), which gave a list of the mortal women who had become the mothers of heroes and some account of those heroes' exploits. The poem was divided into five books, of which probably the last two bore the special title *Ῥοῖαι* from the fact that each division began with *ἥ οἷν*, 'or such a woman as was.' The extant *Shield of Hercules* (*Ἄσπις Ἡρακλέους*), in 480 verses, borrowed its introduction from the fourth book of the preceding work. The greater part of the poem is occupied with an account of the shield of Hercules, which is an inferior imitation of the description of Achilles' shield in the *Iliad*. There were a number of other Hesiodic poems in antiquity; of these only scanty fragments are left. The *Contest between Homer and Hesiod* (*Ὁμηρον καὶ Ἡσίοδον Ἀγών*), usually printed with Hesiod's works, is a product of the time of Hadrian. See Mair's work, referred to above.

Hesiod exhibits none of the splendid imagination and vivid power of Homer; his verses are filled rather with proverbial sayings and homely precepts; they offer a calendar and a mythology for the common people. But the form is the same as that of the Homeric poems, and the dialect on the whole shows little divergence from that seen in Homer. (See GREEK LANGUAGE, *Dialects, Ionic*.) Hesiod was, however, highly

prized for his moral precepts, and the poems played an important part in Greek education. Their influence, especially that of the *Works and Days*, was not confined to Boeotia and Locris, where a Hesiodic school developed, but extended to Ionia and can be seen in the development of iambic poetry. In his *Georgics* (q.v.) Vergil (q.v.) was indebted to Hesiod. The poems formed the subject of learned comment from the Alexandrian age to the Byzantine period. The best editions are by Lennep (Amsterdam, 1843), Schömann (Berlin, 1869), Flach (Berlin, 1874), Gütting-Flach (Leipzig, 1878), Paley (1883), Rzach (Leipzig, 1902), Sittl (Athens, 1890). The *Theogony* was edited, with notes, by Aly (Heidelberg, 1913). There are translations of the *Works and Days* by Chapman (London, 1858); of the entire poems by Elton (2d ed., London, 1832), by Banks (London, 1892), and by Mair (Oxford, 1908). Consult also: Flach, *Die hesiodischen Gedichte* (Berlin, 1874); Fick, *Hesiod's Gedichte* (Göttingen, 1887); Grote's *Greece*, vols. i and ii passim (5th ed., London, 1888); the histories of Greek literature; Adam, *Religious Teachers of Greece* (Edinburgh, 1908); Rzach, in Bursian's *Jahresbericht* (full bibliography, Berlin, 1908); Meyer, "Hesiod's Erga," etc., in *Genethliakon Carl Robert* (Berlin, 1910); Rand, "Horatian Urbanity in Hesiod's 'Works and Days,'" in *American Journal of Philology*, xxxiii (Baltimore, 1911).

HESPELER. A town in Waterloo Co., Ontario, Canada, on the Speed River and on the Grand Trunk Railway, 9 miles south of Guelph and about 45 miles southwest of Toronto (Map: Ontario, D 7). The Galt, Preston, and Hespeler Electric Railway connects Hespeler with the Canadian Pacific Railway at Galt. There are manufactories of woodworking machinery, furniture, blacksmiths' tools, stoves and furnaces, textiles, woolen-mill machinery, sashes and doors, lightning rods, and enameled iron. The town contains two parks and owns a hydro-electric power plant. Pop., 1901, 2457; 1911, 2368.

HESPERIA (Lat., from Gk. *Ἑσπερία*, from *ἑσπέρα*, *hespera*, *ἑσπερος*, *hesperos*, evening star, evening, the west, Lat. *vesper*, evening). The land of the west—a term applied by the ancient Greek poets to Italy and by the Roman writers sometimes to Italy and sometimes to the Iberian Peninsula (Spain).

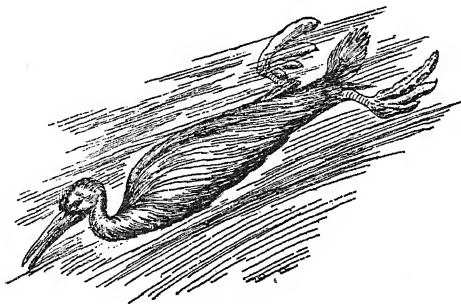
HESPERIDES, hēs-pēr'i-dēz (Lat., from Gk. *Ἑσπερίδες*, *Hesperides*, from *ἑσπέρα*, *hespera*, evening). In Greek mythology, in the earliest version, the daughters of Erebus and the Night, who on an island far in the west, at the borders of the western ocean (aided by the sleepless dragon Ladon), keep in a garden the golden apples which Gæa produced as a wedding gift for Zeus and Hera. The number and names of the Hesperides varied, but the common version seems to have known three—Ægle, Erythea, and Hesperis, or Hesperethusa. Later genealogists represented them as daughters of Hesperis and Atlas (q.v.), who was also localized in the Far West. With the aid of Atlas, Hercules (q.v.) secured three of the apples for Eurystheus, but they were restored by Athena. Apples from the garden of the Hesperides, as symbols of love and fruitfulness, figure in the stories of the marriage of Cadmus (q.v.) and Harmonia (q.v.), and of Peleus (q.v.) and Thetis (q.v.), and of the race of Atalanta (q.v.). Some have thought of the apples of the Hesperides as

typifying the sun, which, in Germanic legends, is described as hanging by night on a tree, while a dragon keeps the light from men till he is overpowered by some beneficent force. Consult C. M. Gayley, *The Classic Myths in English Literature and in Art* (2d ed., Boston, 1911).

HESPERIDES. The title of the collection of Robert Herrick's poems published in 1648.

HES'PERIS. See DAME'S VIOLET.

HESPERORNIS, hēs'pēr-ōr'nīs (Neo-Lat., from Gk. ἑσπερος, *hesperos*, west + ὄρνις, *ornis*, bird). A primitive, flightless, toothed sea bird,

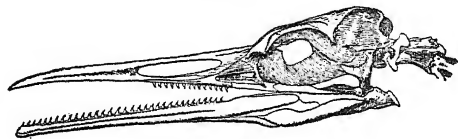


THE HESPERORNIS.

After a drawing by Joseph Gleeson, representing an ideal figure, in the attitude of swimming; based upon skeletons in the National Museum.

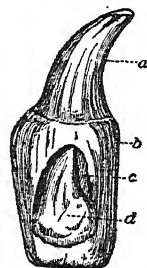
found fossil in the Middle Cretaceous shales of western Kansas and, excepting *Archaeopteryx*, the oldest bird known. The first skeleton was discovered in 1871 by Prof. O. C. Marsh, near the Smoky Hill River, in marine deposits of yellow chalk and calcareous shales, and was named *Hesperornis regalis*. Several other species have since become known; and *Enaliornis*, of the Upper Greensand of Cambridge, England, appears to be a closely allied form. It was a large, well-feathered water bird, having the general habits of a loon, perhaps, ranging the open sea, and scrambling upon land only for breeding. Its food was mainly fishes, which it pursued by swimming and diving, for it had no wings. There is reason to believe that this winglessness was due to degeneracy from fully winged ancestors. *Hesperornis* was more than 5 feet in length, and if its ancestors were equally bulky their wings were quite too large to use under water, but would be folded close against the body when the bird dived or swam. This constant disuse, as the race became more and more exclusively aquatic, would permit the wings to dwindle. By the time the wings were small enough to be of use as paddles under water, as modern auks use theirs, the muscles had become too feeble to move them in so dense a medium, and so degeneration continued until only a remnant of humerus remained. Correlative with this was a constant growth and strengthening of the legs, which became of great size (though the bones remained hollow, like those of an aerial bird) and so twisted as to turn edgewise when the foot was brought forward after each stroke, thus offer-

ing least resistance to the water. The original skeleton set up by Marsh, and depicted in his *Odontornithes*, stood erect like a penguin. When an attempt was made at the National Museum to mount another skeleton in a swimming attitude, it was discovered that this position required an altogether novel arrangement of the legs, such as is shown in the accompanying sketch of a restoration based by Lucas (see above) upon this skeleton. It appears that the

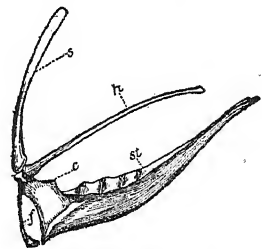


SKULL AND TOOTHED BEAK OF HESPERORNIS REGALIS.

legs of this bird must have stood out almost at right angles and have acted like a pair of oars. To this most powerful apparatus for swim-

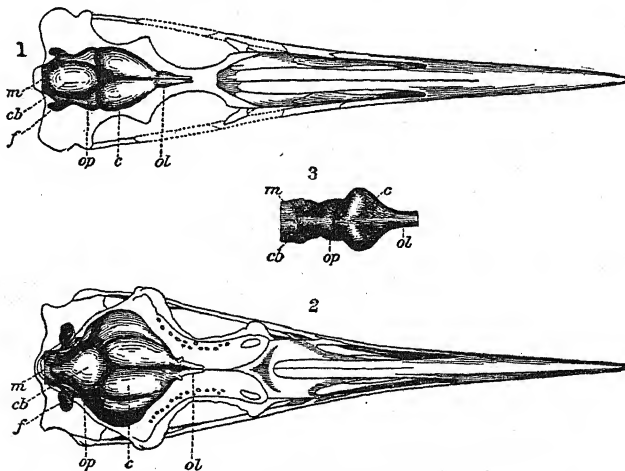


A TOOTH OF HESPERORNIS.
a, crown; b, root; c, absorbed cavity in the root, containing a young tooth (d).



SHOULDER GIRDLE.
Hesperornis regalis; s, scapula; h, humerus; f, clavicle or furculum; c, coracoid; st, sternum.

ming and chase was added the best of means for seizing and holding the agile, slippery, and often bone-incased prey, in the form of a long neck,

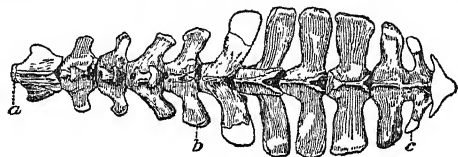


COMPARISON OF SKULLS AND BRAINS.

1. Skull and brain cavity of *Hesperornis regalis*, from above. 2. Skull and brain cavity of modern loon. 3. Cast of brain cavity of a young alligator; ol, olfactory lobes; c, cerebral hemispheres; op, optic lobes; cb, cerebellum; f, flocculi; m, medulla. (After Marsh.)

capable of rapid flexure and thrust, and long slender jaws, armed with sharp recurved teeth resembling those of reptiles. They were set in

a common alveolar groove (holecodont dentition)—a fact which differentiates *Hesperornis* from the higher *Ichthyornis* and its relatives, whose teeth were implanted in separate sockets (thecodont). (See BIRD, FOSSIL.) In the upper jaw the teeth were confined to the maxillary bone alone, but in the lower jaw they extended to the tip of the ramus. As this lower jaw was united in front only by a cartilage, as a serpent's, and had on each side a joint which admitted of some elbow-like motion, the power of swallowing was very extensive. The skull, though shaped like that of a loon, had many struthious characters, and the brain was distinctly reptilian in form, and only about one-third as large as that of a modern loon. The skeleton as a whole closely



BONES OF THE TAIL.

Caudal vertebrae of *Hesperornis regalis*, seen from above: a, anterior convex face of first caudal; b, transverse process.

approximates that of modern birds. The vertebrae resemble those of a loon. The shoulder girdle, in its original structure as well as in its degeneracy, and the sternum, which has no keel, are ostrich-like; and it is in the pelvic arch more than elsewhere that traces of reptilian ancestry are evident. The tail contained 12 vertebrae—more than are or have been possessed by any other known bird since *Archaeopteryx*; and they were solid, firmly locked together and winged, so that the outline of the caudal skeleton is spatulate. This, with the evidently strong musculature, would give great power, similar to that of a beaver's tail, and doubtless the organ was an important aid in swimming, by a sculling motion, as well as in steering and controlling progress. Whether it bore quill feathers in pairs, as did the long tail of *Archaeopteryx*, is not known. The legs and feet resemble those of a grebe on a large scale, and it is fair to suppose that they were externally lobed in a similar way. The feathers on the legs, at least, as is known from impressions in the rocks, were soft and rather scanty.

Hesperornis survived for a long period, during which the interior of North America was a shallow sea, stretching from the Alleghanies to the Rocky Mountains, broken by little except the island summits of the Ozark Hills. Professor Marsh says that apparently there was an absence of enemies in the air to be feared by this great diver, since it was more than a match for the huge but toothless pterodactyls, which hovered over the waters in great numbers. The warm sea teemed with fishes and other food; but it also teemed with great swimming lizards (mosasaurs), turtles a dozen feet in length, and large predacious fishes. As the gradual rise of the land towards the close of the Cretaceous epoch more and more inclosed the sea and modified conditions, the struggle for life became too hard for many of its denizens, and *Hesperornis* was among those which early succumbed. With it disappeared forever a primitive type of bird life, for this branch of the avine stock seems to have terminated without leaving any descendants.

Bibliography. The fullest descriptions and illustrations of *Hesperornis* are contained in O. C. Marsh, *Odontornithes: A Monograph of the Extinct Toothed Birds of North America* (Washington, 1880). Consult also: E. D. Cope, *Oretaceous Vertebrates of the West* (Washington, 1877); S. W. Williston, various papers in the *Annual Reports of the University Geological Survey of Kansas* (Lawrence); F. A. Lucas, *Animals of the Past* (New York, 1913); Alfred Newton, *Dictionary of Birds* (ib., 1896). See BIRD, FOSSIL; ICHTHYORNIS.

HESPERUS (Lat., from Gk. Ἑσπερος). The name given by the Greeks to the evening star Venus. He is the son of Astræus, or Cephalos, and Eos. As the morning star, he was early called Phosphorus by the Greeks (Lat., Lucifer, q.v.).

HESPERUS. A surname given to the Green Knight, Sir Pertolope, in the legend of King Arthur. With his three brothers he guarded the approaches of Castle Perilous. In Tennyson's *Idylls of the King* he is called the "Evening Star," but his famous combat takes place at dawn.

HESS, HEINRICH, BARON VON (1788–1870). An Austrian general, born in Vienna. He entered the army in 1805, distinguished himself at Aspern and Wagram, and served in the campaigns of 1813 and 1814. In 1815 he was employed in the War Department, but soon returned to active service under Schwartzemberg, and in 1821 was in the army of occupation in Piedmont. Transferred to the general staff under Radetzky in 1831, he served in Lombardy, where he greatly improved the organization of the army. Hess was promoted to the rank of brigadier general in 1834 and to be field marshal lieutenant in 1842. In 1849 his ability as quartermaster-general was recognized by Radetzky, as contributing largely to the success of the campaign in Italy. During the Crimean War (1854–55) Hess commanded the observation corps in Galicia and Transylvania. In 1859 he was sent to Italy and was involved in the Emperor's defeat at Solferino. For his part in the truce of Villafranca he was made field marshal. Two years afterward he was named a member of the House of Lords for life.

HESS, HEINRICH VON (1798–1863). A German painter, born at Düsseldorf. He studied with his father, Karl Ernst Christoph von Hess (1755–1828), an engraver, born at Darmstadt. He attracted attention at an early age and was sent to Italy in 1821 to complete his studies. In 1828 he was made professor at the Munich Academy and in 1849 director of all the galleries in the city. The frescoes in the basilica of St. Boniface, 22 scenes from the life of that saint, in the execution of which he was assisted by Koch and Schraudolph, and those in the church of All Saints (both in Munich), are probably his best works. He also produced other notable frescoes and many cartoons for windows. His oil paintings include "St. Luke," "Christmas Eve," and "Faith, Hope, and Charity." One of his best portraits is that of Thorvaldsen.

HESS, JOHANN (1490–1547). A German preacher of the Reformation, born at Nuremberg and educated at Leipzig and Wittenberg. He returned to Wittenberg (1520), after acting as secretary to the Bishop of Breslau and traveling in Italy, where he came under the influence of the Humanists. In 1519 he received the de-

gree of doctor of theology from the University of Ferrara. Strongly influenced by Luther and Melancthon, he went back to Breslau and did much for the spread of the Reformation there. Consult Köstlin, "Johann Hess, der Breslauer Reformator," in the *Zeitschrift des Vereins für Geschichte und Altertum Schlesiens*, vols. vi, xii (Breslau, 1893-99).

HESS, JOHANN JAKOB (1741-1828). A Swiss theologian, born at Zurich, where he became deacon (1777) and (1795) superintendent of the churches in the canton. He wrote original studies on the life of Christ: *Geschichte der drei letzten Lebensjahre Jesu* (1768-73); *Jugendgeschichte Jesu* (1773); and, including these, *Lebensgeschichte Jesu* (8th ed., 1822-23). Consult Escher, *Johann Jakob Hess* (Zurich, 1837), and Zimmermann, *Die zürcher Kirche von der Reformation bis zum dritten Reformationsjubiläum* (Zurich, 1877-78).

HESS, LUDWIG (1877-). A German composer and Lieder singer, born in Marburg. At the age of five he began to study the piano and a little later also the violin. From 1895 to 1900 he studied composition and singing at the Hochschule für Musik in Berlin. Then he went for one year to Milan to complete his vocal studies with M. Vidal. His beautiful and splendidly trained tenor voice, coupled with high musical intelligence and dramatic power, in a very short time secured him recognition as one of the greatest of Lieder singers. He sang in every country of Europe and met with great enthusiasm during his American tour of 1911. He made a specialty of the most modern songs (Strauss, Regér, Schillings, Hausegger). Especially as an interpreter of Hugo Wolf, he has few equals. As a composer, he attracted attention through a symphony, several choral works with orchestra, and about 100 songs.

HESS, MOSES (1812-75). A German-Jewish Socialist. He was born and educated at Bonn, but early left home because of disagreements with his orthodox father. After a precarious life in England and France he returned to Germany, where reconciliation with his father brought him employment. His first writing in the field of philosophy was *Die heilige Geschichte der Menschheit* (1837), in which he attempted to unify the philosophies of Hegel and Spinoza. Later he wrote *Die europäische Triarchie* (1841), which advocates a triple alliance between England, France, and Germany against "barbaric" Russia. He also gave his support to Socialism. Like Karl Marx, Bruno Bauer, Max Stirner, and other famous contemporaries, Hess was greatly impressed with the views of Proudhon—so much so that he became an enthusiastic exponent of philosophical anarchism. After the Moslem atrocities at Damascus in 1860 he advocated a general exodus of his brethren to Palestine, his views appearing in *Rom und Jerusalem* (1862; 2d ed., 1899). In 1863, on his second return to Germany, he became actively connected with Lassalle's famous workingmen's movement. Afterward he made France his adopted country, and it was there that death interrupted what was to be his greatest work, *Dynamische Stofflehre*, the opening chapters of which were published posthumously in 1877. Consult Theodore Zlociste, *Moses Hess: Jüdische Schriften* (Berlin, 1905).

HESS, PETER VON (1792-1871). A German battle painter, born at Düsseldorf. He was the son of Karl Ernst Christoph von Hess, the en-

graver, and the brother of Heinrich von Hess. He studied under his father and then in the Munich Academy and was with the German army in the campaign of 1813-15. His first large picture was the "Battle of Arcis-sur-Aube" (1817). Afterward he was appointed painter to the Bavarian court. In 1839 he went to Russia and painted two pictures from scenes in the War of 1812 for the Emperor Nicholas. His other works include genre pictures; a series of oil sketches for the Munich Hofgarten, representing Greek stories; "The Entrance of King Otho into Nauplia"; "St. Leonard's Festival in Bavaria"; "Plundering Cossacks"; "A Marketing Scene"; a "Surprise"—all minutely painted and of good color.—His brother KARL (1801-74), born at Düsseldorf, was an animal, landscape, and genre painter. Notable works by him are: "On Lake Starnberg" (1835); "A Tyrolean Landscape" and "Cattle in a Pasture" (1822), both in the National Gallery, Berlin. He was also an engraver.

HESS, RICHARD (1835-1916). A noted German forester. He was born at Gotha, studied at Aschaffenburg and at Göttingen, and at the age of 23 entered the forestry service at Gotha. After 1868 he was for many years director of the Academic Institute of Forestry at the University of Giessen, where he also occupied a chair as one of the professors. His chief book is *Der Forstschutz* (Leipzig, 1876-78; 3d ed., 2 vols., 1896-99). Among his numerous other writings may be mentioned: *Grundriss zu Vorlesungen über Forstbenutzung und Forsttechnologie* (2d ed., Berlin, 1901); *Der akademische Forstgarten bei Giessen als Demonstrations- und Versuchsfeld* (2d ed., Giessen, 1890); *Die Eigenschaften und das forstliche Verhalten der wichtigsten in Deutschland vorkommenden Holzarten* (2d ed., Berlin, 1895); *Encyclopädie und Methodologie der Forstwissenschaft* (Nordlingen, 1885-92).

HESS, WILLY (1859-). A German violinist, born at Mannheim. He was educated by his father, and when only nine years of age began his career as a virtuoso. For eight years he played in the United States, Holland, and Germany. Then he studied for two years (1876-78) with Joachim, through whose recommendation he was appointed to the important post of concert master of the Frankfurt Opera and Museum Concerts. In 1886 he went to Rotterdam as professor at the conservatory, and from 1888 to 1895 he was concert master of the Hallé Orchestra in Manchester. Then he was in Cologne as concert master of the Gürzenich Orchestra until 1903, when he returned to England as successor to Sauret at the Royal Academy of Music in London. In 1904 he succeeded Franz Kneisel as concert master of the Boston Symphony Orchestra, filling that position till 1910, when he returned to Germany, this time succeeding Karl Halir in Berlin. Wherever he resided he established a string quartet which immediately rose to prominence. His playing is distinguished by intellectual grasp, breadth of style, and a certain impetuosity.

HESSE, hēs (Ger. *Hessen*). A former landgraviate of Germany. The region was occupied in early times by the *Catti*, or *Chatti* (Ger. *Katten*). Their first appearance in history is in 15 A.D., when Germanicus destroyed their principal settlement, Mattium, the site of the present villages of Grosse and Klein Maden, near Gudensberg, in the Prussian District of

Cassel. In the course of time the Catti became merged in the Frankish tribes, who, when they migrated into Gaul, left Hesse uninhabited, whereupon the Saxons took possession. The Carolingians ruled the country by means of counts, and the power soon became hereditary in one family, the head of this family being elected in 911 King of Germany as Conrad I. After his death and that of his brother Eberhard, the country fell into many divisions, until in 1137 Count Louis I of Thuringia married the daughter of Count Geiss IV of Gudensberg, who belonged to the most powerful family in Hesse, and soon thereafter the Hessian nobles accepted Louis as their overlord; but the Thuringian line of landgraves died out in 1247, with Heinrich Raspe, the opponent of Frederick II. In 1263, after a long contest, Sophia (died 1284), niece of Heinrich Raspe, obtained full possession of Hesse, and from her son and successor, Henry I, surnamed the Child (died 1308), all the various branches of the Hessian family still trace their descent. His descendants added many valuable territories to their old patrimony. After the possessions of the house had been for a time divided, William II in 1500 was in complete control of all Hessian territories, to which he added Homburg, and in 1509 his five-year-old son, Philip the Magnanimous, succeeded him. He was declared of age in 1518 and thereafter played a very prominent rôle in German affairs and to some extent in Europe, being a leader in the German Reformation. He founded the University of Marburg. (See PHILIP THE MAGNANIMOUS; LUTHER.) Philip, on his death, in 1567, divided his territory among his four sons. The eldest, William IV, obtained half of the Hessian domains, with Cassel for his residence; Louis, a fourth part, with Marburg; Philip, an eighth part, with Rheinfels; and George, an eighth part, with Darmstadt. The death of Philip and Louis left all the Hessian dominions in the two main lines of Hesse-Cassel and Hesse-Darmstadt. See HESSE (grand duchy); HESSE-CASSEL.

HESSE. A grand duchy of Germany, the eighth German state in size, lying between lat. 49° 24' and 50° 50' N. and long. 7° 51' and 9° 39' E., consisting of two main divisions and 11 small exclaves. The northern main division, called the Province of Upper Hesse (Oberhessen), is surrounded by the Prussian Province of Hesse-Nassau, and the southern lies between Prussia, Bavaria, Baden, and the Bavarian Palatinate (Map: Germany, C 3-4). Area, 2965 square miles. The southern division of the duchy consists of the provinces of Rhine-Hesse and Starkenburg. Five of the exclaves border on, or are inclosed by, Baden and Württemberg. The remainder of the exclaves are within Prussian territory.

Physical Features and Climate. The surface consists of level, hilly, and mountainous sections. Upper Hesse is mountainous and is identified with the basaltic Vogelsberg, situated in the east, and rising from the prevailing Triassic rocks to a height of about 2500 feet. From this group radiate spurs and outliers west and north through the province, leaving in the south the Wetterau, an extensive, undulating, and arable tract of Upper Hesse. Into the southwest part of the province extends the north end of the Taunus, about 2000 feet high. The east half of Starkenburg is also mountainous, being occupied by the Odenwald Range,

with four peaks reaching about 2300 feet—Krähberg, Hardberg, etc. The western part is in the Rhine valley proper, and in the north lies the low region bordering on the Main. Rhine-Hesse is mostly in the Rhine plain. The western part of this province consists of a rolling country of hills. The Hardt Mountains enter on the southwest, but their highest point (the Eichelberg) has an altitude of only about 1050 feet. The Rhine and the Main form the north border of the southern division of Hesse. The whole grand duchy, except the Vogelsberg district, belongs to the Rhine basin. The Neckar barely reaches Hesse on the southeast. Other Rhine tributaries from the right are the Lahn, the Weschnitz, and the Modau. On the left the Rhine receives the Selz and Nahe. To the Weser basin section of Upper Hesse belong the Fulda and the Schwalm.

The climate differs somewhat in the two main divisions of the duchy, being rather raw and cold in most of the northern part, while the southern division (except the Odenwald) and the Wetterau have the mild climate of south Germany. The mean annual temperature in Darmstadt is 49° F.—in summer 65° F., in winter 29.7° F.; average rainfall, 33 inches. There are several mineral springs and salt-water baths in Hesse; viz., at Salzhausen, Bad Nauheim, etc.

Industries. The number of people whose main occupation is agriculture is about 25 per cent smaller than that of those engaged in industry and mining. In 1907 there were enumerated 147,078 agricultural holdings, of which 93,132 were under 2 hectares, 52,389 between 2 and 20 hectares, 1444 between 20 and 100 hectares, and 113 over 100 hectares (one hectare equals 2.47 acres). Over 63 per cent of the area is under cultivation. There is 31 per cent in forest, nearly one-third of which is state property. The forests constitute an important source of income-producing wealth. About one-half of the total area is arable, and one-eighth is in meadows and pastures. Rye, barley, wheat, and oats are cultivated. Hay and potatoes are produced in large quantities, and fruit is extensively grown. The cultivation of the vine, together with the production of fine wines, is a very important industry, not only in Rhine-Hesse, but on the slopes of the Odenwald. There were about 7500 acres in sugar beets in 1912. Agriculture is promoted actively by a government board of agriculture at Darmstadt, by numerous associations, and excellent agricultural schools which instruct in all branches of farming, fruit growing, etc. Fishing and hunting yield well commercially. Stock raising as a separate industry can hardly be said to exist. In 1913 there were 62,912 horses, 324,488 cattle, 53,838 sheep, 142,008 goats, and 409,372 hogs.

The mining region of Hesse is found chiefly in the northern part and produces coal, iron, and salt. In 1911 the mined minerals amounted to \$1,122,000, and salt \$128,000. In 1913, 25 iron and steel foundries, employing nearly 2000 persons, produced 31,407 tons, valued at \$1,613,000. Peat is an important output, and Hainstadt-am-Main exports famous clays. The manufacturing industries are generally in a prosperous condition. Hesse is known for its manufactures of leather and leather goods. Other chief manufacturing products are tobacco and cigars, metal articles, paper, sugar, chemicals,

spirits, etc. There are four beet-sugar factories. The duchy has many handicraft schools.

Commerce and Transportation. The trade of Hesse is of considerable importance and is favored by many organizations and industrial banks as well as by the central position of the grand duchy and the excellent transportation facilities. The exports consist mainly of agricultural and manufactured products; the chief imports are raw and half-finished materials. The river commerce is extensive, including much Belgian and Dutch trade. On Jan. 1, 1913, Hesse owned 358 canal and river boats, having a carrying capacity of 110,055 tons. There are 928 miles of railway, nearly all owned by Hesse, Prussia, and Baden.

Government and Finance. The government is that of a hereditary constitutional monarchy. The Grand Duke is very largely dependent on the civil list, which amounts to about \$300,000. The constitution was adopted in 1820 and has been repeatedly modified. The executive power lies in a responsible Ministry of three members, who are the heads of the departments of the Interior, Justice, and Finance. The Minister of Justice is President of the Ministry, and is the Minister of Foreign Affairs and of the Ducal House. The legislative power is represented by two Chambers. The Upper Chamber is composed of all the princes of the reigning house, the heads of several noble families, the Roman Catholic Bishop, a Protestant church dignitary, the chancellor of the University of Giessen, a representative of the technical school, two representatives of the landed nobility, three members representing agriculture, commerce, and industry, and not over 12 life members nominated by the Grand Duke. The Lower Chamber consists of 15 members elected by the large municipalities and 43 members returned by the small towns and rural communities. The members of the Lower Chamber are elected for six years, one-half retiring every three years. The Chambers meet each year. The three provinces are divided into 18 circles. The provinces and circles have local councils elected by a restricted suffrage. The duchy is represented by three members in the German Bundesrat and returns nine members to the Reichstag. The budget for 1913-14 was estimated at \$26,829,000. The chief items of revenue are from public domains, Imperial customs, and direct taxes. The chief articles of expenditure are for education, public health, the public domains, service of the debt, and contributions to the Empire. The public debt amounted in 1913 to \$103,442,500, nearly all incurred for railways.

Population and Religion. The population was 992,883 in 1890, 1,119,893 in 1900, and 1,282,051 in 1910, showing an increase of nearly 15 per cent in 10 years. Hesse ranks seventh as to population among the German states. Number of inhabitants per square mile, 432. Emigrants are few; in 1913 only 145 left the country. Darmstadt (q.v.) is the capital; the largest city, Mainz; other large towns are Offenbach and Worms. Over 66 per cent of the inhabitants are Protestants. The Grand Duke is Protestant and is the head of the Evangelical church* (embracing the Lutheran and the Reformed). It is governed by a synod and a consistory. The seat of the Roman Catholic Bishop is at Mainz. The state contributes to both the leading faiths. This item was \$114,567 in 1913.

Educational and Other Institutions. Edu-

cation is free, compulsory, and maintained partly by the government and partly by the communes. In 1913 there were 979 public elementary schools with 4053 teachers and 215,709 pupils. Secondary education is represented by 102 institutions, of which 22 are schools for girls. Included in the 102 are 11 Gymnasias, 2 Progymnasias, 3 Realgymnasias, 9 Oberrealschulen, 9 Realschulen, 1 agricultural college (at Gross Umstadt), 32 incomplete Realschulen (höhere Bürgerschulen), 29 preparatory schools, and 6 higher girls' schools. There are numerous continuation schools for scholars leaving the elementary schools. Higher education is supplied by the University of Giessen and also by the Technical School of Darmstadt. The latter had 1578 students in the winter semester of 1913-14. Both institutions are supported in part by the state. There are, in addition, not only the industrial schools, but numerous special institutions, as, e.g., a merchants' school and an ivory-carving school. The important libraries and museums number three each, besides six smaller public libraries. Hesse has a state fire-insurance company, and institutions or pensions or insurance funds for all classes of needy, ill, or otherwise unfortunate persons, including indigent ladies of the nobility. In this respect Hesse is one of the most highly organized commonwealths in the world.

History. (See preceding article.) The line of Hesse-Darmstadt, the second main branch of the house of Hesse, is derived from George I, the fourth son of Philip the Magnanimous, Landgrave of Hesse, who on the death of his father, in 1567, obtained the Principality of Katzenelnbogen, with the town of Darmstadt for his residence, and received in 1583, on the death of his brother Philip without heirs, a third of the patrimony of the latter. (See HESSE-CASSEL.) At his death, in 1596, he was succeeded in the greater part of his possessions by his eldest son, Louis V (1596-1626), while another son, Frederick, became the founder of the Hesse-Homburg line (q.v.). Louis V acquired a portion of Upper Hesse and is noted as the founder of the University of Giessen (1607). His son, George II (1626-61), and grandson, Louis VI (1661-78), did much to promote learning and the arts. During the Thirty Years' War and the reign of Louis XIV of France, the country was laid waste by the Swedish and French armies. The finances became disorganized, and Louis VIII (1739-1768) did little to mend them. Louis IX (1768-90) was a wise and able ruler, a patron of art and letters. As a result of the French Revolutionary wars, under Louis X (1790-1830), Hesse-Darmstadt changed its boundaries materially, on the whole to its gain. Louis X joined the Confederation of the Rhine in 1806 and assumed the title of Grand Duke as such (Louis I). He aided Napoleon with troops until 1813, but at the Congress of Vienna (1814-15) was obliged to make large cessions of territory to Prussia and Bavaria, receiving, however, by way of indemnification, a large district on the Rhine, including the towns of Worms and Mainz, in right of which he assumed the traditional title of Rhenish Grand Duke. At this time Hesse-Darmstadt became a member of the German Confederation. In 1820 Louis promulgated a constitution establishing a parliamentary form of government. He instituted various reforms and joined the Zollverein (q.v.) in 1828. The

reactionary policy of Louis II (1830-48) evoked a strong opposition in the Landtag, but the Grand Duke finally succeeded in subordinating the Chambers to his will. The February revolution of 1848 in France, however, lent renewed strength to the Liberal party. In answer to the popular demand for constitutional reform, the heir to the throne was named Coregent with the King; Gagern, the great leader and apostle of German unity, was made Minister of the Interior; and a far-reaching programme of reform adopted, many features of which were carried out only to be abrogated and followed by a period of strong repression. Louis III succeeded his father in 1848. His chief adviser, Dalwigk, was a bitter enemy of Prussia, and in 1866 Hesse-Darmstadt sided with Austria against the former. The Grand Duke made a vain appeal to Napoleon III, of whom he was a personal friend, for assistance. The Hessians were defeated at Laufach (July 13), and Prussian troops occupied the grand duchy. The Grand Duke was forced to cede some territory, including the recently acquired Hesse-Homburg (q.v.), to pay a heavy war indemnity, to receive a garrison in Mainz, and to enter into an offensive and defensive alliance with Prussia. The Hessian troops played a conspicuous part in the war against France, and Hesse-Darmstadt became a part of the new German Empire. Louis IV (1877-92) did much to restore the finances and increase the prosperity of the duchy. He was succeeded in 1892 by his son, Ernst Ludwig (q.v.), the present (1914) ruler. See HESSE-CASSEL.

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HESSE, hēs'se, HERMANN (1877-). A German author. He was born in Calw, Württemberg, had no university training, but studied in a secondary school, and was in turn a mechanic, a bookseller, and an antiquarian. His very quiet life was spent at Gaienhofen on the Bodensee. His few books—all the later ones popular and constantly reprinted—have a particular value as studies of childhood and youth. They include *Hermann Lauchers Nachlass* (1901); *Gedichte* (1902); *Peter Camenzind* (1904), the experiences of a Swiss peasant in the great world; *Unterm Rad* (1905), the development of a dreamy boy; *Diesselts* (1907); and short stories.

HESSE, hēs'se, LUDWIG OTTO (1811-74). A German mathematician. He was born in Königsberg and studied and taught there from 1840 to 1856. After that he held professorships of mathematics successively at Halle, Heidelberg, and in the Polytechnic School at Munich. He was a disciple of Jacobi and contributed chiefly to geometry and the theory of determinants.

His important mathematical works include: *Vorlesungen über die analytische Geometrie des Raumes* (1861; 3d ed., 1876); *Vorlesungen aus der analytischen Geometrie der geraden Linie, des Punktes und des Kreises* (1865; 3d ed., 1881); *Vier Vorlesungen aus der analytischen Geometrie* (1866; completed in 1874); *Die Determinanten elementar behandelt* (1871); *Die vier Species* (1872). A list of his memoirs may be found in the *Catalogue of Scientific Papers of the Royal Society of London*, vols. iii and vii. The name of Hesse is connected with an important determinant form known as the Hessian, or Hessian covariant, which is of great value in the study of curved lines and surfaces. (See DETERMINANTS.) An edition of his works was published by the Bavarian Academy of Sciences (Munich, 1897). Consult Noether, "Otto Hesse," in the *Zeitschrift für Mathematik und Physik*, vol. xx (Leipzig, 1875).

HESSE-CASSEL, or ELECTORAL HESSE (Ger. *Hessen-Kassel*, hēs'sen kä'sel). A former landgraviate, later electorate, of Germany, forming at present the district of Cassel in the Prussian Province of Hesse-Nassau.

History. The house of Hesse-Cassel, representing the elder line of the house of Hesse, was founded by William IV the Wise, the eldest of the four sons of Philip the Magnanimous (1509-67). (See HESSE.) William, who ruled as Landgrave from 1567 to 1592, was a good administrator and left a well-consolidated little principality to his son, Maurice, who resigned the government in 1627 to his son, William V., and died in retirement five years later. William (1627-37) fought on the side of Sweden during the Thirty Years' War, for which he was put under the ban of the Empire and forced to cede some of his territory. His two brothers, Hermann and Ernest, founded the lines of Hesse-Rothenburg and Hesse-Rheinfels. In 1637, on the death of William V, Amelia Elizabeth, his widow, assumed the regency for their young son, William VI, and ruled with vigor and ability. In the Peace of Westphalia (1648) the greater part of Schaumburg and the secularized Principality of Hersfeld were acquired. William VI died in 1663 and was succeeded by his sons, William VII (1663-70) and Charles I (1670-1730). The latter inaugurated the practice, continued by his successors, of hiring out Hessian soldiers to fight in the service of foreign princes, by which the finances of the state were considerably augmented at the expense of the welfare of the people. On the death of Charles his son, Frederick I, who in 1720 had become King of Sweden, in right of his wife, the Princess Ulrike Eleonore, sister of Charles XII, resigned the government of his Hessian territories to his brother, William VIII, who succeeded him as Landgrave in 1751 and ruled until 1760. He fought under the British and Hanoverian flag in the Seven Years' War and gained considerable military renown for himself and his troops. Frederick II (1760-85) kept up a splendid court on the subsidies received from England for the services of the Hessians (see HESSIAN) who fought against the Americans in the War of Independence and expended much of his treasures in the patronage of art and in the erection of public edifices. Frederick, who had become a convert to the Roman church, was succeeded by William IX (1785-1821), who reigned as William I after his elevation to the rank of Elector in 1803. This prince frequently shifted sides during the French

wars. In 1806, at the time of Prussia's struggle against Napoleon, he remained neutral; but Napoleon, nevertheless, seized his electorate, which was incorporated in the newly formed Kingdom of Westphalia (1807). In 1813, after the defeat of Napoleon at Leipzig, William returned to his dominions and began to restore the old order of things as far as he could, while he sought to recover the state lands that had been sold during his exile and appealed so strongly for indemnification that he obtained various important concessions at the Congress of Vienna, although he failed to secure the title of king. In accordance with a promise which he had made on his restoration he summoned a body of jurists to construct a constitution; but no sooner was the draft completed than he refused to abide by it. His death, in 1821, was regarded as a fortunate event. But his son and successor, William II (1821-47), by his narrow policy increased the rapidly growing disorders of the state, while his prodigality towards his mistress, the Countess of Reichenbach, rendered him peculiarly unpopular with his subjects. In 1831, as a result of the July revolution in France, William was compelled to promulgate a constitution. At the same time his son, Frederick William, was appointed Co-regent. The history of the 16 years' regency of Prince Frederick William exhibited a retrogressive policy, pursued at first under the guidance of Hassenpflug (q.v.), which left Hesse far behind other German states in material prosperity. The death of the old ruler occurred at Frankfurt in 1847. The revolutionary movement of 1848 extorted from Frederick William I (1847-66) many liberal promises of reform, some of which were redeemed; but in 1850, after revoking many of his pledges, he summoned again the obnoxious reactionist Hassenpflug to govern the country. The elector and his Minister resorted to the most arbitrary measures to force the excited people to submission, and Hassenpflug persuaded the sovereign that his personal safety would be endangered if he remained longer among his subjects, and Prince and Minister fled from Cassel to Wilhelmsbad. Hassenpflug appealed for federal intervention, and Austrian and Bavarian troops entered the country. The friends of liberal government looked to Prussia for support. On Nov. 2, 1850, a Prussian army entered Hesse-Cassel; but the Prussian King was timid, and the war was principally limited to angry protocols. External force was now applied to quell all opposition to the despotic sway of Frederick William, who in 1852 returned to Cassel. A new constitution was promulgated, which in no way satisfied the people, whose conduct throughout the trying crisis had been marked by forbearance and moderation. But the policy of the government remained unchanged. Not until 1862, after much agitation and powerful pressure from Prussia, was the Prince forced to accede to the constitution of 1831. After this concession, however, he still ruled in such a way as to paralyze the political activities of the country. In the Seven Weeks' War of 1866 Hesse-Cassel sided with Austria. A Prussian army entered the principality, June 16, 1866, and Frederick William was taken prisoner and conveyed to Stettin, where he remained till September 17. Three days later Hesse-Cassel was incorporated with Prussia. The deposed Prince died Jan. 6, 1875, leaving no direct heir. Most of his property was given to cadet branches of the same line.

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HESSE-DARMSTADT. See HESSE.

HESSE-HOMBURG, hēs'-hōm'būrg (Ger. *Hessen-Homburg*). Formerly a landgraviate, containing about 106 square miles, composed of the district of Homburg vor der Höhe on the right of the Rhine and that of Meisenheim on the left. The landgraviate was an integral part of Hesse-Darmstadt till it was transferred in accordance with the disposition made by the Landgrave, George I (died 1596), to his youngest son, Frederick I, in 1622. In 1768 it became a completely separate landgraviate. It was mediatized in 1806 and constituted a part of Hesse-Darmstadt till the Congress of Vienna (1815), when its independence was restored and its territory augmented by the addition of Meisenheim. The opening of the springs and baths at Homburg in 1833 proved an unexpected source of wealth to the state, and after the addition of gambling saloons the establishment constituted a very important branch of the revenue. Attempts were more than once made by the Diet to put down the gambling tables; but whenever the pressure of federal intervention was removed, gambling was always resumed with fresh spirit, and the system continued till 1872. In 1848 a liberal constitution was granted, but was not long in effect. In March, 1866, on the death, without heirs, of the last landgrave, Ferdinand, who had succeeded his brother, Gustavus Augustus, in 1848, Meisenheim went to Prussia, and the landgraviate fell to Hesse-Darmstadt, but remained united with that duchy only a few months, being ceded to Prussia on Sept. 3, 1866, on account of its support of Austria. Consult Herget, *Das landgräfliche Haus Homburg* (Homburg, 1903).

HESSE-NASSAU, hēs'-nās'sā (Ger. *Hessen-Nassau*, hēs'-sen-nās'sou). A province of Prussia, the southwestern part of the kingdom, lying between the Rhine and the Weser, and composed chiefly of the larger portions of Hesse-Cassel, Nassau, and Hesse-Homburg. It also contains the city of Frankfurt (q.v.) (Map: Germany, C 3). The main body of the province is bordered by the Rhine Province, Westphalia, Waldeck, Hanover, and Prussian Saxony, Saxe-Weimar-Eisenach, Bavaria, and the southern division of Hesse, and incloses the Hessian Province of Upper Hesse. Among the several exclaves that belong to Hesse-Nassau are the Countship of Schaumburg and the Thuringian district in which Schmalkalden is situated. Area, 6051 square miles.

Topography. The province is generally an elevated region. In the south are the rich valleys of the Main and Rhine; in the north lies the Weser valley; but, as a whole, the province belongs to the mountain region of middle Germany and consists of high, rolling districts broken by peaks and rather prominent spurs and outliers. In the east are the Kaufunger Wald and portions of the Rhöngebirge, Vogelsberg, and Spessart. The Westerwald is in the west, and the important Taunus Range in the extreme southwest. The western part of the province is traversed by the Lahn, an affluent of the Rhine. In the north-

east are the Fulda and the Werra which unite to form the Weser. The climate is mild and generally even.

Industries. The principal occupations are agriculture and its allied industries. Of the total area, about 40 per cent is under crops and gardens, about the same proportion is in forests, and the remainder is chiefly in meadow and pasture. Most of the land is distributed into small holdings. According to the industrial census of 1907 there were 137,836 holdings of less than 5 acres each, 88,390 holdings ranging from 5 acres to 50 acres, and 4044 holdings of over 50 acres each. The chief agricultural products are rye, wheat, potatoes, flax, oats, and hay (including clover and alfalfa). Tobacco and beans are cultivated to a considerable extent. Among the well-known wines of the province are the Johannisberger, Hochheimer, and Rüdesheimer. The forests are the most extensive of all the provinces in Prussia and belong mostly to the state and the communities. The trees are conifers, oaks, and beeches. The commercial yield of the forests is large. They abound in game, and the streams are rich in fish. Live-stock raising is not carried on extensively as a separate industry. In 1913 there were 89,520 horses, 622,349 cattle, 151,490 sheep, 197,404 goats, and 767,495 swine.

The mineral deposits are important, principally iron ore and coal. Of the former, about 400,000 tons are obtained annually; of the latter, over 600,000 tons. Hesse-Nassau is one of the leading iron producers among the Prussian provinces. There are some deposits of zinc, lead, and copper. Good clay is found. The mineral springs and health resorts of the province are both numerous and famous, including those of Homburg, Wiesbaden, Ems, Schwalbach, and Selters. Several of the waters, especially the Selters, are exported extensively to all parts of the civilized world.

The manufacturing industries, with some exceptions, are on a small scale. The industrial census of 1907 gives the total number of mining and industrial establishments at 71,472, employing 349,336 persons. The chief manufactured products are cotton and woolen goods, tobacco, cigars, and sugar. Also worthy of mention are the exports of marble, dressed stone, and burnt clay, and wooden wares, leather, and jewelry. There were 327 distilleries in operation in 1912-13, the yearly production amounting to over 400,000 gallons. The province has important fairs and markets, especially horse markets, and the trade and manufacturing interests are furthered by means of numerous chambers of commerce. The banks of Frankfurt, the financial centre of this part of Germany, are celebrated for their strength and the extensive scope of their undertakings. The transportation facilities are fully adequate to the needs of the province. The railways, with a total mileage of 1325 in 1912, are mostly controlled by the state. The splendid roads and natural waterways aid very materially in the distribution of products. The commerce is concentrated largely in Frankfurt, Cassel, and Wiesbaden. Other important business towns are Hanau and Fulda. In 1907 there were 45,883 commercial establishments employing 129,122 persons. These figures include hotels and transportation concerns.

Government and Education. Administratively Hesse-Nassau is divided into the two districts of Cassel and Wiesbaden, subdivided into

24 and 17 circles respectively. The former district is about twice the size of the latter, but has less population, Frankfurt being included in the latter. Cassel (q.v.) is the capital. The province is represented in the Prussian Landtag by 26 deputies in the Lower Chamber and by 17 members in the House of Lords (1913). The highest educational institution is the University of Marburg, founded in 1527. There are an academy for the social and commercial sciences at Frankfurt, forestry schools at Spangenberg and Hachenburg, schools of design at Hanau and Cassel, an agricultural school at Weilburg, a farmers' association at Cassel, and an agriculture and forestry association at Wiesbaden. There are also several unions for bee and bird raising and gardening.

Population. The population was 1,664,426 in 1890, 1,897,981 in 1900, and 2,221,021 in 1910, showing an increase of 17 per cent in 10 years. Population per square mile, 366.3. About 68 per cent of the inhabitants are Protestant, 28 per cent Catholic, and over 2 per cent Jews. For the history of Hesse-Nassau, see **HESE-CASSEL**; **HESE-HOMBURG**; **NASSAU**.

HESE-WARTEGG, hēs'se-vär'tэг, ERNST VON (1851-). An Austrian traveler, born in Vienna. His travels covered most of the habitable globe. He married Minnie Hauk (q.v.), the opera singer, in 1881. He wrote, among many books of travel: *Prairiefahrten* (1878); *Nordamerika, seine Städte und Naturwunder u. s. w.* (4 vols., 1879); *Tausend und ein Tag im Occident* (1890); *Chicago* (1893); *Curiosa aus der neuen Welt* (1893); *Korea* (1895); *China und Japan* (2d ed., 1900); *Schan-tung und Deutsch-China* (1898); *Siam* (1899); *Samoa, Bismarckcarolinen und Neuguinea* (1902); *Amerika als neueste Weltmacht der Industrie* (1900); *Die Balkanstaaten* (1910).

HESHU'SIUS, TILMANN (1527-88). A German Lutheran theologian, born at Wesel and educated at Wittenberg, Oxford, and Paris. From his post as lecturer of New Testament exegesis in Wittenberg, he went to Goslar (1553), then to Rostock (1556), to Heidelberg as professor of theology (1558), and then preached at Bremen and (1560) at Magdeburg. In all these places his love of strife, his extreme orthodoxy, and his absolute opposition to Crypto-Calvinism or to any form of Lutheranism less rugged than his own, brought him into trouble. He had to leave Magdeburg and, driven from one town to another, settled at Neuburg in 1565 as court preacher. From there he went to Jena (1569), but left and became Bishop of Samland at Königsberg (1574). He retired in 1577 and became professor at Helmstedt. Heshsius wrote: *Von Amt und Gewalt der Pfarrherren* (last ed., by Schütz, 1854); *Antidotum contra Dogma M. Flaccii, quod Peccatum Originis Sit Substantia* (1572); *Assertatio Testamenti Christi* (1574). Consult Wilkens, *Tilman Heshsius* (Leipzig, 1860), and Helmolt, *Tilman H. und seine sieben Epistola* (ib., 1859).

HESSIAN, hēs'h'an. In American history a term for the German conscripts who were hired and sent over by England to help subdue the revolting colonists. They came from six of the small states of Germany; but as over half of them were from Hesse-Cassel and Hesse-Darmstadt, the name "Hessian" was generally applied to them. They were first commanded by Lieut. Gen. Philipp von Heister, but he was succeeded by Wilhelm von Knyphausen (q.v.) in 1777.

They took a prominent part in the battles of Long Island, White Plains, Trenton, Bennington, Brandywine, Germantown, Guilford Court House, Yorktown, and several other smaller engagements. The Hessians made excellent soldiers, being ever ready to bear the brunt of the heaviest fighting and hardly ever desirous of deserting. Of the approximate 30,000 who came over to America, only 17,000 returned to Germany. About 2200 were killed outright or died of their wounds. The rest settled in various parts of the United States and Canada. Grants were given to many of them in Nova Scotia, but they gradually drifted southward over the boundary.

HESIAN COVARIANT. See DETERMINANTS; HESSE, L. O.

HESIAN FLY. A dipterous insect (*Cecidomyia destructor*), which, from the damage which the larva does to wheat in North America and also to some extent in Europe, has become one of the most widely known of insects. It is dark in color, nearly black, with dusky wings and pale-brown legs. While distinctively a wheat insect, it will breed also in barley and rye. Over a large part of the wheat area of the United States there are two principal broods, viz., a spring brood and a fall brood. There are, however, supplemental broods both in spring and fall, particularly in the southern wheat areas; but in the extreme northern area of the spring wheat belt there may be only a single generation. Each generation is represented by four distinct states, viz., egg, larva or "maggot," pupa or "flaxseed," and the mature winged insect. The eggs are small, white in color, and are usually deposited in rows of three to five or more on the upper surface of the leaf. Sometimes they are thrust beneath the sheaf of the leaf on the lower joints. The whitish maggots hatch and crawl down to the base of the sheath, developing on the substance of the stalk, causing a distortion or enlargement of the stalk at the point of attack. In a few weeks the larva contracts into a flaxseed-like object, which is the puparium. With the spring brood the insect remains in the flaxseed state during midsummer. With the fall brood the insect passes the winter in the flaxseed state at the base of the winter wheat.

The best remedies are the late planting of winter wheat or the early planting of a narrow strip in which the flies will lay their eggs and which may afterward be plowed under, the bulk of the crop being planted late. The copious and prompt use of fertilizers enables the wheat to tiller sufficiently to yield a partial crop even when badly attacked. Consult: *Hessian Fly in Wheat* (Pennsylvania Department of Agriculture, Harrisburg, 1890); H. Osborn, *Hessian Fly in the United States* (Department of Agriculture, Washington, 1898); Lugger, *Hessian Fly* (Minnesota Agricultural Experimental Station, St. Paul (1899); F. M. Webster, *Hessian Fly* (Department of Agriculture, Washington, 1906). See HERRICK, E. C.

HESITE. A silver telluride crystallizing in isometric forms. It usually occurs in compact gray masses and is found with other telluride ores in Boulder Co., Colo. Hessite frequently contains gold.

HESITIA. See VESTA.

HES/TON AND ISLEWORTH, ɪˈzəl-wərθ. A suburban municipality of London, in Middlesex, England, on the Thames, 12 miles southwest of St. Paul's (Map: London, E 4). Market gardening is carried on, and it is a favorite resi-

dential place of London merchants. Pop., 1901, 30,863; 1911, 43,313.

HESYCHASTS, hēs'i-kās'ts (from Gk. ἡσυχαστής, *hēsychastēs*, quietist, from ἡσυχάζειν, *hēsychazein*, to be quiet, from ἡσυχος, *hēsychos*, quiet). Mystics of the Greek church, and particularly the monks of Mount Athos. (See ATHOS.) In all probability mysticism never entirely died out among the Oriental monastic bodies; but the mystics attracted an unusual share of attention, not only at home but in the Western church, in the earlier half of the fourteenth century. A Basilian monk, named Barlaam (q.v.), in the course of a visit to the monasteries of Greece, observed several practices and doctrines which he considered reprehensible. The monks of Mount Athos especially provoked his reprobation and ridicule. Believing that in the soul lay a hidden divine light, which it was the office of contemplation to evoke, they withdrew at stated times to a retired place, seated themselves on the earth, and fixed their eyes steadfastly on the navel (whence the sobriquet by which they were known, *ομφαλόψυχοι*, navel souls); and they averred that, after the allotted time of contemplation, a kind of heavenly light beamed forth upon them from the soul (whose seat, they held, was in that region) and filled them with ecstasy and supernatural delight. They declared that this light was the glory of God Himself, the same light which appeared at the transfiguration of the Lord. The belief was explained and defended by Gregory Palamas, the Archbishop of Thessalonica; and in order to settle the controversy, a council was held in Constantinople in 1341 which terminated in the triumph of Palamas and the monks. Barlaam held that a divine uncreated light could only be the essence of God; and so that this belief gave two gods, a visible and an invisible. Palamas held that the light was not the essence, but the energy of God, and so the belief was not polytheistic. Other councils were called one of which, in 1531, again pronounced in favor of the monks, through the influence, it was said, of the court and of John Cantacuzenus, who was a patron of the Hesychasts. But the public voice was hostile to the sect, and on the retirement of their patron, Cantacuzenus, who in 1355 became a monk, they fell into obscurity. The belief in the uncreated light was decreed an article of faith in the Council of 1351, reaffirmed in 1368, and is still a part of the orthodox Greek doctrine. The works of Barlaam are in Migne, vols. cl-eli; of Palamas, vol. cli. Consult: Stein, *Studien über die Hesychasten des XIV. Jahrhunderts* (Vienna, 1874); Karl Holl, *Enthusiasmus und Bussgewalt bei dem griechischen Mönchtum* (Leipzig, 1898); Adolf Harnack, *History of Dogma*, vols. iii, iv (Boston, 1899).

HESYCHIUS, hē-sīk'i-ūs (Lat., from Gk. Ἡσύχιος). A Greek grammarian of Alexandria, belonging probably to the fifth century A.D. He was the author of a Greek lexicon, or rather a glossary, of unusual words, taken partly from earlier works of a similar character, especially that of Diogenianus (q.v.), with the addition of new words and examples from the writings of poets, orators, historians, and physicians. Its value is very great, since it is the largest of our extant ancient Greek lexicons, and since it helps us to the correct readings in many texts, especially of Æschylus and Theocritus, and contains no little information concerning the Greek dialects and about Greek religion and social life.

It was used by Suidas (q.v.). The best edition is that of Schmidt (4 vols., Jena, 1858-68). Consult: David Ruhnken, *Opuscula*, vol. i, preface (Leyden, 1823); Wentzel, "Hesychiana," in *Hermes* (1898); Christ-Schmid, *Geschichte der griechischen Literatur*, vol. ii (5th ed., Munich, 1913).

HESYCHIUS. According to Jerome, a reviser of the New Testament and also of the Septuagint, in the third century. He is generally identified with a Hesychius said by Eusebius (*History*, 8: 13) to have been Bishop of Alexandria and to have died a martyr during the Galerian persecution, about 311.

HESYCHIUS OF MILETUS (flourished probably c.550 A.D.). A Greek chronicler, surnamed The Illustrious (ὁ Ἰλλούστριος). We hear of three works by him: (1) a universal history, in six books, beginning with the Assyrian King Belus and coming down to the reign of the Byzantine Emperor Anastasius (518), of which a part of the sixth book, covering the history of Constantinople from the earliest times to the reign of Constantine (324), has been preserved, under the title *Πάτρια Κωνσταντινουπόλεως*; (2) a history of the reign of Justin (518-527) and the earlier years of Justinian (527-565), now lost; (3) a biographical dictionary of Greek writers (*Ὀνοματολόγος ἢ πινὰξ τῶν ἐν παιδείᾳ ὀνομαστῶν*), which was extensively excerpted by Photius (q.v.) and Suidas (q.v.). Photius praises Hesychius' style and his veracity. The fragments of his works are collected by Müller, *Fragmenta Historicorum Græcorum*, iv (Paris, 1841-70), Flach (Leipzig, 1882), and Preger, in *Scriptores Originis Constantinopolitaneæ*, vol. i (ib., 1901). An attempt to "recover" Hesychius from Suidas and other excerpters has been made by Flach, *Hesychii Milesii Onomatologi quæ Supersunt* (Leipzig, 1882). Consult Christ-Schmid, *Geschichte der griechischen Literatur*, vol. ii (5th ed., Munich, 1913).

HETÆRÆ (Neo-Lat., from Gk. *ἑταῖρα*, *hetaira*, fem. of *ἑταῖρος*, *hetairos*, comrade, companion; connected with *ἕρς*, *hetēs*, kinsman). In ancient Greek society, women of more or less unconventional life. They were apt to be slaves or foreigners and, skillful in dance or music, gave private or public entertainments. As, under the Athenian law, only a citizen's daughter could marry a citizen, many women, often of otherwise excellent character, were constrained, if they desired companionship, to accept concubinage. Some—e.g., Aspasia (q.v.), the instructor of Socrates and the friend of Pericles—were highly accomplished and exerted great and wholesome influence upon state policy. Others, like Leontium (see *HERMESIANAX*), Phryne (q.v.), Thais (q.v.), and Theodota, while possessed of personal grace and charm and more or less intellectual distinction, were more properly courtesans. The various words for women of irregular life should be sharply distinguished. *Hetæra*, like *concubina*, implies fidelity to a single man, and such relation may well have been a true marriage. *Meretrix*, *pornē*, and *scortum* signify a quite different thing—the harlot or prostitute. There was still another class represented by the words *pallakē*, *pallakis*, and *pellea*, signifying a mistress kept by a man already married. In the New Attic comedy and so in the Latin adaptations of Plautus (q.v.) and Terence (q.v.) the *hetærae* are a conspicuous feature of the plot, and the *Letters of Alciphron* (q.v.) find in this their source, as do also the *Conversations of Hetærae*

by Lucian (q.v.). Consult William Smith, *Dictionary of Greek and Roman Antiquities*, vol. i (3d ed., London, 1890).

HETÆRIA PHILIKE, *hēt'ā-rē'ā fē-lē'kē* (Gk. *ἑταιρία φιλική*). A secret society of Greek sympathizers—chiefly orthodox Russian partisans—founded at Odessa in 1814, to promote the liberation of Greece from Turkish rule; and although its members were more or less mistrusted by the Greeks, it was, under the leadership of Prince Alexander Ypsilanti, an important contributory cause of the Greek War of Independence in 1821. Consult George Finlay, *History of the Greek Revolution* (2 vols., Edinburgh, 1861).

HETCH'EL. See HACKLE.

HETCH HETCHY VALLEY. See SAN FRANCISCO.

HETEROCHTHONOUS, *hēt'er-ōk'thō-nūs*. See AUTOCHTHONOUS.

HETEROCELA (Neo-Lat. nom. pl., from Gk. *ἑτερος*, *heteros*, other + *κοῖλος*, *koilos*, hollow). One of the two orders of calcareous sponges, including those in which the endoderm is composed of flagellate collared cells. In the other order, Homocela, collared cells are restricted to flagellate chambers, and flattened cells compose the remainder of the endoderm. See SPONGE.

HETEROCYST (from Gk. *ἑτερος*, *heteros*, other + *κύστις*, *kystis*, bag). A term applied to certain cells, empty or with watery contents, found in the filaments of blue-green algæ. See ALGÆ; CYANOPHYCEÆ.

HETEROGAMY (from Gk. *ἑτερος*, *heteros*, other + *γάμος*, *gamos*, marriage). A condition in plants, contrasted with isogamy (q.v.), in which the pairing sex cells (gametes) are differentiated into sperms and eggs. Most plants are heterogamous in this sense. It should be understood that heterogamy refers only to a difference in the appearance of the pairing gametes, so that they can be recognized as male and female. In fact, pairing gametes are always differentiated physiologically, whether they look alike or unlike. The term is also used when two kinds of flowers exist on the same plant; as, e.g., in certain *Compositæ*, where the development of stamens and pistils differs in the disk and the ray flowers. See FERTILIZATION.

HETEROGENESIS (Neo-Lat., from Gk. *ἑτερος*, *heteros*, other + *γένεσις*, *genesis*, generation, from *γενεσθαι*, *gignesthai*, Skt. *jan*, to be born). A term bearing various meanings and relations. 1. The equivalent of abiogenesis, or spontaneous generation. (See BIOGENESIS.) 2. A mode of reproduction in which the parent produces offspring unlike itself, as opposed to *homogenesis*, or the production of offspring like the parent or parents. See ALTERNATION OF GENERATIONS.

HETEROGONY. See PARTHENOGENESIS.

HETEROPHORIA (Neo-Lat., from Gk. *ἑτερος*, *heteros*, other + *-φορία*, *-phoria*, carriage, from *φέρειν*, *pherein*, to carry), or INSUFFICIENCY. A condition in which the eyes are only prevented from deviating by constant muscular effort. Exophoria is the term applied to the tendency of an eye to look outward while the other is fixed upon an object; esophoria, to the tendency to deviate inward. The trouble is due to relative weakness of an eye muscle, the result of some error of refraction or in persons generally run down. In severe cases there are headache, pain in the eyes, occasional double vision,

blurring of point, and irritability of the eyelids. The difficulty is treated by attention to the general health and correction of errors of refraction by eyeglasses. Exercise of the weak eye muscles is also employed with, sometimes, partial tenotomy of the overactive muscle.

HETEROPHYLLY (from Gk. *ἕτερος*, *heteros*, other + *φύλλον*, *phyllon*, leaf). That condition in which there are two or more forms of leaf on the same plant—a condition particularly well shown in amphibious plants in which the water leaf is finely divided, but the air leaf is entire and compact. See **LEAF**.

HETEROPHYTES, hēt'er-ō-fits (from Gk. *ἕτερος*, *heteros*, other + *φυτόν*, *phyton*, plant). Heterotrophic plants, or those that do not obtain their food materials from inorganic matter, but are dependent upon antecedent or coexistent organic forms for their food supply. They may be divided into saprophytes, which obtain their food from dead organic matter, and parasites, which obtain food or food materials from living organisms. The contrasting term is "autotrophic," applied to green plants because they manufacture their own food and are thus independent of other organisms. The terms are convenient, but not exact, for in autotrophic plants only those parts are really autotrophic (self-nourishing) which contain chlorophyll. See **PARASITE**; **SAPROPHYTE**; **SYMBIOSIS**.

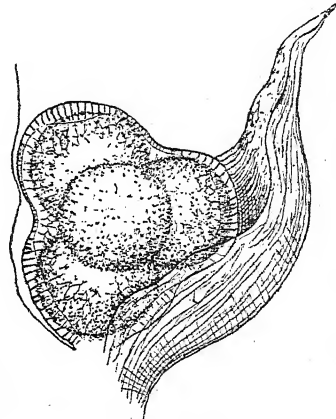
HETEROPODA (Neo-Lat. nom. pl., from Gk. *ἑτερόπους*, *heteropous*, having uneven feet, from *ἕτερος*, *heteros*, other + *πούς*, *pous*, foot). A suborder of small pelagic pectinibranchiate Gastropoda (q.v.). They swarm at night at the surface of the ocean and swim rapidly about with their backs downward and their ventral surfaces uppermost. Their bodies are small, delicate, and often transparent, with well-demarcated heads, and well-developed sense, circulatory, breathing, and reproductive organs. The foot is compressed to form peculiar blade-like swimming organs. Most heteropods are naked; but some genera, among them *Atlanta*, *Carinaria*, and *Ocyropsis*, have delicate involute shells. These resemble in some respects those of certain fossil bellerophons of Paleozoic age, and the resemblance has led many authors to include the Bellerophonidae with the Heteropoda in spite of their larger size and heavier and thicker shells. See **BELLEROPHON**; **GASTROPODA**.

HETEROPORA (from Gk. *ἕτερος*, *heteros*, other + *πόρος*, *poros*, passage, pore). A very common genus of bryozoans in the Mesozoic era, its numerous species being especially abundant in Jurassic and Cretaceous times, while in Tertiary and recent times it has become quite rare. Its zoarium, though variable, is generally ramose, sometimes composed of several layers of tubes and with the walls of neighboring tubes thoroughly amalgamated. The apertures of the zoecia are rounded, those of the numerous interstitial tubes angular and surrounding the zoecia. See **BRYOZOA**.

HETEROPTERA (from Gk. *ἕτερος*, *heteros*, other + *πτερόν*, *pteron*, wing). A suborder of the Hemiptera, including the "true" bugs, characterized by dissimilarity in the wings. The proximal half of the anterior pair of wings is thickened, much like those of beetles. The suborder includes a number of aquatic forms, some of which occur out at sea hundreds of miles from land. The water boatman (*Corixa undulata*), with a pair of oarlike legs, the large water bug or "electric-light bug" (*Belostomatidae*), and the long-legged water striders are, perhaps, the best known of the aquatic forms. The bedbug, red bug, chinch bug, squash bug, and stinkbugs (q.v.) are other familiar and important Heteroptera. See **HEMIPTERA**; **HO-MOPTERA**.

HETEROSPOROUS. See **HETEROSPORY**.

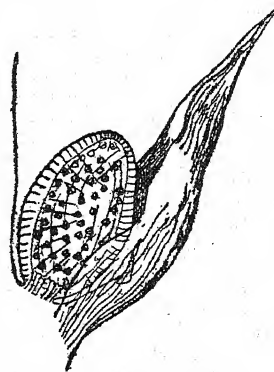
HETEROSPORY (from Gk. *ἕτερος*, *heteros*, other + *σπόρος*, *sporos*, seed). The production, by plants, of two kinds of asexual spores. Heter-



HETEROSPORY.

Megasporangium of a club moss containing four megaspores.

ospory is one of the most important phenomena in connection with the evolution of the plant kingdom, since through it the seed has appeared, and a clear conception of flowering plants is impossible without some knowledge of the beginnings of heterospory. The phenomenon appears first, and in its simplest form, among certain of the fern plants (Pteridophytes) and is universal among the seed plants (Spermatophytes). To understand the significance of heterospory it will be necessary to read the article on **ALTERNATION OF GENERATIONS**, since this



HETEROSPORY.

Microsporangium of a club moss containing numerous microspores.

deals with the two kinds of spores produced by the sexless generation (sporophyte).

In ordinary ferns the spores are alike, and in germination each one produces a sexual plant (gametophyte), which bears both the male and the female sex organs. Such a condition is called homospory (q.v.), or isospory, which means in

each case "spores similar." In certain club mosses the spores differ in size, some being very much larger than others. The large spores are called megaspores and the small ones microspores. More important than the fact of difference in size, however, is the other fact that the microspores produce sexual plants which bear only male organs, and the megaspores sexual plants which bear only female organs. There is a very definite relation between the amount of nutrition and the appearance of the female organs, so that the larger and hence better-nourished spore is expected to produce a female plant. In consequence of heterospory, therefore, the gametophytes become distinctly male and female. In short, the most significant result of heterospory is the sexual differentiation of individuals. The unfortunate thing is that the sexual character has often been attributed to the microspores and the megaspores, which are simply the asexual spores of a sporophyte, which necessarily produce gametophytes.

When spores become thus differentiated in size and in product, the spore cases (sporangia) are also differentiated, so that certain sporangia produce only microspores, and others produce only megaspores. The former were naturally called microsporangia and the latter megasporangia. The megasporangia and the microsporangia of the heterosporous Pteridophytes are indistinguishable up to the mother-cell stage, i.e., the stage at which all the sporogenous tissue has been formed. If all the mother cells, or approximately all of them, produce spores, these very numerous spores will be microspores. If, on the other hand, only one mother cell produces spores, all the others contributing nutrition towards its increase in size, the four very large spores produced by this large mother cell will be megaspores. The primordium of a sporangium, therefore, is often indifferent, resulting in a microsporangium or a megasporangium, dependent upon the conditions that determine the number of functioning mother cells. These sporangia are ordinarily produced upon leaflike structures, and later the leaves bearing sporangia become differentiated in the same way, so that certain leaves bear only microsporangia and other leaves only megasporangia. Naturally the former were called microsporophylls and the latter megasporophylls. These names are used in connection with those fern plants which are heterosporous, as the water ferns, the little club mosses (*Selaginella*), and the quillworts (*Isoetes*). Among the seed plants (flowering plants), however, the corresponding structures already possessed names long in use and not to be discarded. It is important, however, to know the structures among the seed plants that correspond to those among the heterosporous fern plants. It is found that the stamen (q.v.) of a flowering plant is a microsporophyll, that its pollen sacs are microsporangia, and that the pollen grain is a microspore. The interesting conclusion is reached, therefore, that the pollen grain is an asexual spore—a conclusion quite contrary to the general impression that it is a male cell, and that the stamen is a male organ. It is found that the carpel (q.v.) of a flowering plant, which organizes the ovary, style, and stigma, is a megasporophyll; that the ovules are megasporangia; and that the so-called embryo sac is a single large unshed megaspore. It follows, therefore, that the ovule is by no means the egg which its name would imply, but the spore case (sporangium) of a sexless plant.

An important further fact in connection with heterospory is that upon its development the sexual plants (gametophytes) become very much reduced in size, for the most part not escaping from within the spores which produce them. As a consequence, the male plant or generation in a flowering plant is contained entirely within the pollen grain; and the female plant or generation is completely inclosed within the ovule. For further development of the subject in connection with the evolution of the seed, see SEED.

HET'MAN. See ATAMAN.

HETTINGER, hêt'ting-ër, FRANZ (1819-90). A German Catholic theologian, born at Aschaffenburg and educated at Würzburg and at the German College in Rome. He became a priest in 1843, in 1847 returned to Würzburg as assistant in the theological seminary, and nine years afterward was appointed professor in the university. Hettinger wrote: *Apologie des Christentums* (8th ed., 1899-1900); *Lehrbuch der Fundamentaltheologie* (2d ed., 1888); *Timotheus: Briefe an einen jungen Theologen*; and many studies on Dante, of which the most important is *Die göttliche Komödie nach ihrem wesentlichen Inhalt und Charakter dargestellt* (2d ed., 1889). Consult the biography by Kaufmann (Frankfurt, 1891).

HETTNER, hêt'nër, ALFRED (1859-). A German geographer, son of Hermann Hettner. He was born at Dresden, studied at Halle, Bonn, and Strassburg, and was professor of geography at Leipzig, Tübingen, and Heidelberg. He made two expeditions to South America—to Colombia (1882-84) and to Peru and Bolivia (1888-90)—and in 1895 became an editor of the *Geographische Zeitschrift*, for which he wrote on anthropology and geographical methodology. He published: *Gebirgsbau und Oberflächengestalt der sächsischen Schweiz* (1887); *Reisen in den colombianischen Anden* (1888); *Die Cordillere von Bogota* (1892); the text in Spamer's *Atlas* (1896; 2d ed., 1900); *Europa* (1907).

HETTNER, HERMANN THEODOR (1821-82). An important German literary and art critic, born at Leisersdorf (Silesia). He studied in Berlin, Halle, and Heidelberg. He had traveled extensively in Italy and become known through various volumes on literary and critical subjects before he was made professor of aesthetics at the University of Jena (1851). Afterward he became director of the cabinet of antiquities in Dresden (1855) and professor of the history of art in the Academy of Fine Arts. In 1868 he was appointed director of the Historical Museum. His most important work is *Litteraturgeschichte des achtzehnten Jahrhunderts* (1856-70; parts i and ii, 5th ed., 1894; part iii, 4th ed., 1893-94); parts i and ii deal with English and French literature. He also wrote *Die romantische Schule in ihrem Zusammenhange mit Goethe und Schiller* (1850); *Griechische Reise-skizzen* (1853); *Das königliche Museum der Gipsabgüsse zu Dresden* (4th ed., 1881); *Italianische Studien: Zur Geschichte der Renaissance* (1879). Consult H. H. Stern, *Hermann Hettner: Ein Lebensheld* (Leipzig, 1885), and Hugo Spitzer, *H. Hettners Kunstphilosophische Anfänge und Literaturästhetik* (Graz, 1903).

HET'TON. A town in the County of Durham, England, 5 miles northeast of Durham. The mining of extensive coal deposits in the vicinity constitutes its principal industry. Pop., 1901, 13,633; 1911, 15,678.

HETZEL, â'tsêl', PIERRE JULES (1814-86).

A French publisher and littérateur, born at Chartres. From 1835 he was associated with Paulin, the French publisher, and afterward took part in politics as a Republican. After the revolution of 1848 he was chief of a department in the Ministry of Foreign Affairs and Secretary General of the provisional government. After the coup d'état he was exiled and lived in Brussels until the amnesty of 1859. During that time he published a series of French classics. Upon his return to France he published, among other volumes, the romances of Jules Verne. He had founded, with M. J. Macé, a *Magasin d'éducation et de récréation* (1854), which was very successful, and his best claim to general interest, although his stories for children have always been popular. Under the pseudonym of P. J. Stahl he wrote, notably: *Le diable à Paris* (1842); *Voyage où il vous plaira* (1842-43), with Alfred de Musset; *Théories de l'amour et de la Jalousie* (1853); *L'Esprit des femmes et les femmes d'esprit* (1851); *Les quatre fils du docteur Marseh* (1880); *Les quatre peurs de notre général* (1881).

HETZER, hêts'ér, LUDWIG. See HÄTZER, LUDWIG.

HEUBERGER, hoi'bërg-ër, RICHARD (1850-1914). An Austrian composer, born at Graz. By profession a civil engineer, he did not take up music seriously until 1876. Two years later he became conductor of the Vienna Singakademie, but gave up that post in 1881 and devoted himself to musical criticism. He composed much instrumental music and the operas *Abenteuer einer Neujahrsnacht* (1886); *Manuel Venegas* (1889), which was rewritten as the grand opera *Miriam, oder das Maifest* (1894); *Barfüßele* (1905); and several ballets and operettas.

HEUBNER, hoip'nër, OTTO (1843-). A German physician, born at Mühltröf. He studied at Leipzig and Vienna, was long connected with the former university, and in 1894 went to Berlin as professor and manager of the clinic for children. In 1913 he resigned his professorship. Among his writings are: *Die leutische Erkrankung der Hirnarterien* (1874); *Die experimentelle Diphtherie* (1883); *Klinische Studien über die Behandlung der Diphtherie mit dem Behring'schen Heilserum* (1895); *Syphilis im Kindesalter* (1896); *Lehrbegriff der Kindheilkraft* (1911).

HEUCHERA, hü'kë-rä. See ALUM ROOT.

HEUGLIN, hoi'glin, THEODOR VON (1824-76). A German traveler and ornithologist, born at Hirschlanden, Württemberg. From 1850 to 1865 he spent most of his time in Africa. While attached to the Austrian consulate at Khartum, he visited Dongola and Abyssinia, and afterward described his travels in a volume entitled *Reisen in Nordostafrika* (1857). He became Consul at Khartum in 1853. He visited the White Nile, the Sudan, and the west coast of the Red Sea; in 1860 set out with a party for the interior of Africa to determine the fate of the explorer Eduard Vogel, and returned to Europe with rare collections. He published *Ornithologie Nordostafrikas* (1869-75) and *Reise in das Gebiet der westlichen Zuflüsse des weissen Nil* (1869). Journeys made in 1870 and 1871 to Spitzenberg and Nova Zembla he described in *Reisen nach dem Nordpolarmeere* (1872-74).

HEULANDITE, hü'land-ít. A hydrous calcium and aluminium silicate occurring in mono-

clinic crystals and crystalline aggregates. The lustre is pearly to vitreous and the color white, red, or brown. Heulandite occurs with the other zeolites in basaltic rocks and in gneiss.

HEUMANN, hoi'màn, CHRISTOPH AUGUST (1681-1764). A German scholar. He was born at Allstedt, studied at Jena, and in 1717 became head of the Gymnasium at Göttingen. In the university he was made professor of the history of literature (1734) and of theology (1745). His great works, *Acta Philosophorum* (last ed., 1717-24) and *Conspectus Reipublicæ Literariæ* (last ed., 1791-97), by the use of the analytical system, founded modern German literary history. He also translated, with a commentary, the New Testament (1750-63). Consult the life by Cassius (Cassel, 1768).

HEUMANN VON TEUSCHENBRUNN, fon toít'shen-bröön, JOHANN (1711-60). A German jurist and writer on diplomacy, born at Muggendorf in Bavaria, and educated in history and law at Altdorf, where in 1740 he became professor. The first jurist to approach the study of diplomacy in a scientific manner, he wrote: *Commentarii de Re Diplomatica Imperatorum ac Regum Germaniæ* (1745-53); *Exercitationes Juris Universi* (1749-57); *Initia Juris Politicæ Germanicæ* (1757); *Geist der Gesetze der Deutschen* (2d ed., 1779).

HEUN, hoin, KARL GOTTLIEB SAMUEL (1771-1854). A German novelist, known under the pseudonym "H. Claren," born at Dobrilugk, and educated at Leipzig and Göttingen. He became in 1792 Secretary in the departments of Mining and Foundries in Westphalia. In 1811 he received a place in a bureau of the Chancellor Hardenberg, and in 1820 became editor of the *Preussische Staatszeitung*. Heun is best known by the first line of a poem on the War of Liberation, *Der König rief, und alle, alle kamen*. His novels include: *Erzählungen* (1819-20); *Die graue Stube* and *Mimili* (4th ed., 1824); *Scherz und Ernst* (10 vols., 1820-28). He also wrote dramas, *Lustspiele* (2d ed., 1827). His works show a sentimental and sensual character that made them popular for a time with the lower classes. A collection of his works appeared at Leipzig in 25 volumes (1851).

HEUSLER (hois'lër) **ALLOYS**. In 1903 F. Heusler proved that it was possible to magnetize certain alloys of nonmagnetic elements. Thus, an alloy of manganese and tin, one of manganese, copper, and tin, one of manganese, aluminium, and copper, etc., could be magnetized, although not to any marked extent. Since this work of Heusler's many other alloys have been investigated which have similar properties. Heusler himself, as well as other investigators, has attempted to develop a theory; but little progress has been made beyond an experimental determination of the exact proportions of the various constituents and the alloys which give the highest magnetic permeability. Consult Guthe and Austin, "Experiments on the Heusler Magnetic Alloys," in *Bulletin of the United States Bureau of Standards* (Washington, 1906). See **MAGNETISM**; **ALLOYS**, **MAGNETIC**.

HEUZÉ, è'zä', LOUIS GUSTAVE (1815-1907). A French agriculturist, born in Paris. He was educated at the National School of Agriculture at Grignon and was appointed director of the agricultural school at Grand-Jouan in 1840. In 1846 he became professor of agriculture at Nantes. Later he was made administrator of the farm school at Nozay, then professor of

agriculture at Grignon in 1849, and was appointed to the same chair at the opening of the Institute in Paris. In 1880 he was made also inspector general of agriculture and was sent by the French government on various missions to study foreign agriculture. For 50 years he was one of the editors of the *Journal d'Agriculture Pratique* and was a voluminous contributor to popular and scientific agriculture, both foreign and domestic. Among his more important works were: *Les plantes alimentaires* (1873); *Les plantes industrielles* (1893-95); *Coners d'agriculture pratique: Les plantes céréales* (1896-97); *Les plantes alimentaires des pays chauds et des colonies* (1899).

HEVEA, hē'vā-ā. A genus of about ten species of trees, natives of tropical South America, of the family Euphorbiaceae, characterized by trifoliate leaves, loose panicles, apetalous flowers, and a trivalved capsular fruit. The species, especially *Hevea brasiliensis*, furnish the highest grade of South American India rubber.

HEVELIUS, HEVEL, hā'völ, or **HÖWELKE**, hā'völ'ke, JOHANNES (1611-87). An astronomer, born at Danzig. He studied mathematics and law in Leyden, and, after making the "grand tour," in the course of which he became acquainted with Wallis, Cassendi, and other noted scientists of that day, returned about 1634 to his native place, where he served as town councillor till his death in 1687. In 1641 he erected an observatory in his own house, furnished it with large telescopes constructed by himself, and devoted himself to astronomical observations. He was the first astronomer, with the exception of Cassendi, to observe a transit of Mercury (1661). He ranks next to Flamsteed among the astronomers of his day. Towards the end of his life he opposed the notion of using telescopic sights for astronomical instruments of precision, believing that the old method of observing through pinholes, etc., was superior. Halley (q.v.) was sent to Danzig by the Royal Society of London to examine into this question, and the controversy was decided against him. Hevelius' observatory and library were burned in 1679. His extant works include: *Selenographia, seu Descriptio Lunæ* (1647); *De Natura Saturni* (1656); *Prodromus Cometicus* (1665); *Cometographia* (1668); *Machina Cælestis* (1673); *Prodromus Astronomicus* (1690). His letters were published by Olhof in 1683. Consult Brandstätter, *Hevel's Leben und seine Bedeutung* (Danzig, 1861), and Seidemann, *Johannes Hevelius* (Zittau, 1864).

HEVESI, hē'vā-shā, LUDWIG (1843-1910). A German-Hungarian journalist and humorist, sometimes writing under the pseudonym of *Onkel Tom*. He was born at Hoves, studied classical philology and medicine at Vienna, and entered journalism in 1865. In the following year he became one of the editors of the *Pester Lloyd*; then helped launch the humorous Hungarian journal *Borszem Jankó*; from 1871 to 1874 edited the Vienna juvenile *Kleine Leute*; and in 1875 became the art and dramatic critic of the *Fremdenblatt*. He wrote mainly in German. His works include the humorous sketches of travel and collections of stories: *Des Schneidergesellen Andreas Jekky Abenteuer in vier Weltteilen* (1875); *Auf der Sonnenseite* (1886); *Buch der Laune* (1890); *Ein englischer Sep-*

tember (1891); *Regenhagen* (1892); *Von Kalanbis Säckingen* (1893); *Glückliche Reisen* (1895); *Die Althofente* (1897); *Blaue Fernen, neue Reisebilder* (1897); *Das bunte Buch: Humoresken* (1898); *Wiener Totentanz* (1899); *Der zerbrochene Franz nebst andern Humoresken* (1900); *Machek's sonderbare Reisen zwischen Konstantinopel und San Francisco* (1901); his biographies, which are more valuable, *Zerline (abillon)* (1894) and *Wilhelm Junker* (1896), and books of southern travel, *Ewiges Stadt, Ewiges Land* (1903), and *Romne Homers* (1904); *Die fünfte Dimension* (1906); *Den Zug um den Mund* (1907); *Gutmunkeln* (1909); and the art critique, *Oesterreichische Kunst im 19. Jahrhundert* (1903). Consult his biography by L. Speidel (Berlin, 1910).

HEWES, hūz, JOSEPH (1730-79). A signer of the Declaration of Independence, born at Kingston, N. J. He was educated at Princeton and then went to Philadelphia, where he engaged in business. In 1763 he moved to Edenton, N. C., and in the same year was elected to the Legislative Assembly. In 1774 he was elected to the Continental Congress, of which, with the exception of a brief period when he declined to serve, he continued a member until his death, signing the Declaration of Independence in 1776.

HEWETT, hū'ēt, EDGAR LEE (1865-). An American archaeologist, born in Warren Co., Ill., and educated at Tarkio (Mo.) College, at the Colorado State Teachers College, and at the University of Geneva. After serving in various places as teacher and superintendent of schools, he had charge of the training department of the Colorado State Teachers College (1894-98) and was president of the New Mexico Normal University (1898-1903). In 1906 he became director of American archaeology for the Archaeological Institute of America, and in 1907 also director of the School of American Archaeology and the Museum of New Mexico at Santa Fe. Under his supervision were excavated the ancient Maya city of Quirigua, Guatemala, and the ancient cliff dwellings and pueblos of the southwest—especially did he make known the famous cliff-dwelling region of Pajarito Plateau, N. Mex. He is author of many papers on archaeology and anthropology.

HEWETT, EDWARD OSBORNE (1835-97). A Canadian military engineer. He was born in Glamorganshire, Wales, and was educated at Cheltenham College and the Royal Military Academy at Woolwich, where he subsequently became an instructor. In 1854 he was commissioned lieutenant, and in 1860 captain, in the Royal Engineers. In 1861, in anticipation of war with the United States on account of the Trent Affair, he was placed in command of a field company of Royal Engineers for active service in Canada. After his arrival he was appointed Commanding Royal Engineer of Upper Canada (Ontario), west of Toronto, and was for some time engaged in investigating the military resources and defences of Canada, on which he made elaborate reports for the British War Office. He designed and supervised the construction of the military and naval fortifications of Halifax. He was promoted major in 1872, lieutenant colonel in 1879, colonel in 1881, and lieutenant general in 1886. During the Civil War he was present for some months with both the Federal and the Confederate armies. In 1875 he was appointed commandant of the

newly founded Royal Military College, Kingston, and until 1890 labored to perfect its organization and equipment. In the latter year he resigned and returned to London, England.

HEWETT, WATERMAN THOMAS (1846-). An American Germanic scholar, born at Miami, Mo. He graduated from Amherst College in 1869, studied at several foreign universities, and (1879) received a Ph.D. from Cornell University, where he was assistant professor of German in 1870-83 and thereafter professor until he retired in 1910. In 1895 he became general editor of Macmillan's "German Classics." His publications include: *The Frisian Language and Literature* (1879); *University Administration* (1882); *The House of Orange* (1885); *Introduction to the Life and Genius of Goethe* (1886); *William Scherer* (1887); *Ministers and Sovereign in Germany* (1888); *Homes of the German Poets* (1889); *University Life in the Middle Ages* (1898); *Sources of Goethe's Printed Texts* (1898); *Cornell University: A History* (3 vols., 1905); *Bibliography of the Writings of Goldwin Smith* (1912).

HEWINS, WILLIAM ALBERT SAMUEL (1865-). An English economist, born near Wolverhampton. He was educated at Pembroke College, Oxford, was director of the London School of Economics in 1895-1903, taught economic history in the University of London in 1902-03, and was Tooke professor of economics at King's College, London, in 1897-1903. He contested the Shipley Division of Yorkshire and Southeast Lancashire in 1910 in the Unionist interest, and in 1912 was elected to the House of Commons for North Herefordshire. Besides contributions to reviews, to the *Dictionary of National Biography*, and to Traill's *Social England*, he wrote *English Trade and Finance, chiefly in the 17th Century* (1892), edited the *Whiteford Papers* (1898), and published *Imperialism and its Probable Effect on the Commercial Policy of the United Kingdom* (1901). He edited *Studies in Economic and Political Science*.

HEWIT, hū'it, AUGUSTINE FRANCIS (1820-97). An American Roman Catholic clergyman, superior of the Paulist Fathers. He was born in Fairfield, Conn., the son of Nathaniel Hewit, and was baptized as Nathaniel Augustus. He graduated at Amherst in 1839; entered the Congregational ministry in 1842, but a year later joined the Episcopal church. In 1846 he was received into the Roman Catholic church and in 1850 entered the Redemptorists. He joined Fathers Hecker, Walworth, and other members of that order in founding, in 1858, the Congregation of St. Paul the Apostle, and was made professor of theology, philosophy, and Holy Scriptures in their seminary. On the death of Father Hecker he became superior of the Paulists. He edited the *Catholic World* (1860-74) and was a regular contributor to the *American Catholic Quarterly Review*. Among his works are: *Reasons for Submitting to the Catholic Church* (1846); *Problems of the Age* (1868); *The King's Highway, or the Catholic Church the Way of Salvation* (1874). He received the degree of D.D. from Amherst College in 1874.

HEWITSON, WILLIAM CHAPMAN (1806-78). An English naturalist, born at Newcastle-on-Tyne, and educated at York. He practiced land surveying until a bequest from a deceased relative enabled him to study the natural sciences.

He gave great attention first to the Coleoptera and Lepidoptera of Great Britain, then to the study of birds' eggs, in 1833 making a trip to Norway to search for the breeding places of some of the migrating species of England. He devoted the last years of his life to the diurnal Lepidoptera of the world, gradually forming a large and valuable collection, which he left to the natural history section of the British Museum. His library was bequeathed to the Natural History Museum of Newcastle. He contributed many papers on entomology and ornithology to scientific journals, and published: *British Oology* (1833-42); *Colored Illustrations of the Eggs of British Birds* (1846); *The Genera of Diurnal Lepidoptera* (1846), with E. Doubleday; *Illustrations of Diurnal Lepidoptera* (1863-78); *Illustrations of New Species of Exotic Butterflies* (1851-76); *Descriptions of One Hundred New Species of Hesperidae* (1867); *Descriptions of Some New Species of Lycaenidae* (1868); *Equatorial Lepidoptera* (1869-70); *Bolivian Butterflies* (1874).

HEWITT, hū'it, ABRAM STEVENS (1822-1903). An American manufacturer and public man, born at Haverstraw, N. Y., and educated at Columbia College, where he was acting professor of mathematics in 1843. He studied law and was admitted to the bar in 1844, but defective eyesight prevented him from practicing, and he engaged in the manufacture of iron with Edward Cooper, the son of Peter Cooper, and a college classmate, who later became his brother-in-law. In 1862 Mr. Hewitt learned in England the process for making gun-barrel iron, and upon his retirement in 1876 as president of the American Institute of Mining Engineers, he delivered a widely read address upon *A Century of Mining and Metallurgy in the United States*. In 1890 he was again president of this society. He served in Congress in 1871-79 and 1881-86, was chairman of the National Democratic Committee which directed the Tilden campaign in 1876, and was a Democratic member of the House committee which in 1877 conferred with a similar committee from the Senate in regard to the choice of an electoral commission to settle the disputed presidential election. In 1886 he was elected mayor of New York City, defeating Henry George and Theodore Roosevelt. He was an earnest worker for good government and labored with much success for municipal reform. After his administration of two years he remained closely identified with municipal movements, and for his services in furthering the rapid-transit plan in New York City he was awarded a gold medal by the New York Chamber of Commerce in 1901. As a public benefactor, he gave great aid to numerous institutions, and the present educational prominence of Cooper Union, founded by his father-in-law in New York City, is due largely to his services as trustee and secretary. He was chosen chairman of the trustees of the Carnegie Institution at its organization in 1901.

HEWITT, JOHN NAPOLEON BRINTON (1859-). An American ethnologist and linguist. He was born on the Tuscarora reservation, near Niagara Falls, N. Y.; with some Tuscarora blood in his veins, he learned the language of that tribe while a child. He was educated in the public schools of Wilson and Lockport and was successively farmer and journalist till 1879, when, employed by the department of American ethnology in the Smithsonian Institution, he

devoted himself to Indian ethnology and the languages of the Tuscaroras and Iroquois.

HEWITT, JOHN THEODORE (?-). An English chemist, educated at Cambridge, the University of London, and Heidelberg. He became professor of chemistry in East London College and the University of London. His chemical papers appeared in German as well as English technical journals. Among his important studies are those on the chemistry of fluorescence and on the azo-compounds. He patented a method for removing furfural from alcoholic spirits, thus lessening their ill effects as a beverage.

HEWITT, PETER COOPER (1861-). An American inventor and electrical engineer, born in New York City, the son of Abram Stevens Hewitt and the grandson of Peter Cooper. He became a director of the Cooper, Hewitt Electric Company, of Cooper, Hewitt, and Company, and of other corporations; was made a trustee of Cooper Union, and of the House of Rest for Consumptives; and is known as the inventor of the Cooper Hewitt mercury vapor electric lamp, the Cooper Hewitt mercury vapor rectifier—which reduced by more than half the amount of apparatus needed to change alternating current to direct storage batteries—and several mechanical appliances. In 1914 he announced that he had made an important advance in the field of wireless telegraphy, as one result of his 18 years' study of mercury vapor in a vacuum.

HEWLETT, MAURICE HENRY (1861-). An English novelist, born in London and educated there. He was called to the bar in 1891 and in 1896 was made Keeper of the Land Revenue Records and Enrollments. He gained his reputation in 1898 with a romance entitled *The Forest Lovers*. His other books include: *Earthwork out of Tuscany* (1895); *The Masque of Dead Florentines* (1895); *Songs and Meditations* (1897); *Pam and the Young Shepherd* (1898); *Little Novels of Italy* (1899); *Richard Yea-and-Nay* (1900); *New Canterbury Tales* (1901), short stories exquisite in sentiment and execution; *The Queen's Quair* (1904); *The Road in Tuscany* (2 vols., 1904); *Pond Adventures* (1905); *Fool Errand* (1905); *Works* (10 vols., 1905); *The Stooping Lady* (1907); *Brazenhead*; *the Great* (1911); *Mrs. Lancelot: A Comedy of Assumptions* (1912); *Bendish: A Study in Prodigality* (1913); *Love of Proserpine* (1913); short stories and sketches. Hewlett achieved success in various kinds of fiction. In novels like *The Forest Lovers*, *Richard Yea-and-Nay*, and *The Queen's Quair*, and in certain of his short stories, he essayed historical romance and surpassed his contemporaries in interpreting mediæval and renaissance thought and sentiment. *The Fool Errand*, with its intimate transcripts of the ins and outs of Italian social life in the early eighteenth century, and with its substitution of the romance of chicanery for the romance of violence, exemplifies his skill in the picaresque story; and *The Stooping Lady*, with its background of early nineteenth-century struggles for reform and its general modernity, is representative of the Hewlett who has read Meredith and taken a leaf from his book. At his best Hewlett is master of a style that is picturesque, quaint, impassioned, and impressive; but his manner is often strained—even tortured, fantastic, and full of conceits. Artificiality is indeed of the essence of him, and he

will probably be remembered rather as a landscape and figure painter than as a penetrating analyst of motive or creator of character.

HEXACHORD, hēks'a-kōrd (from Gk. ἕξ, *hex*, six + χορδή, *chordē*, chord). In mediæval music, hexachord denotes the six diatonic degrees of which Guido formed his scale, better known by the six syllables, ut, re, mi, fa, sol, la, to which the scale was sung. See GAMUT.

HEX'ACORALLA (Neo-Lat., from Gk. ἕξ, *hex*, six + κοράλλιον, *korallion*, coral). A subclass of zoantharian corals, so named by Haeckel because the radiating septal walls of the polyps are arranged in series of six or multiples of six. Recent researches have shown that the Hexacoralla constitute an artificial group. See CORAL.

HEX'ACTINEL/LIDA (Neo-Lat. nom. pl., from Gk. ἕξ, *hex*, six + ἀκτίς, *aktis*, ray). One of the two orders of siliceous sponges (see SPONGE), comprising those with six-rayed siliceous spicules; they live at considerable depths and include the glass sponge (*Euplectella*) and other hyaline forms. The other order is Desmospongia, including "Silicispongiae devoid of six-rayed spicules." The group is an ancient one, present in geological formations from the Ordovician down to present times. Remains attributed to this group occur in pre-Cambrian rocks at St. John, N. B.

HEXAGON (Lat. *hexagonum*, from Gk. ἑξάγωνος, from ἕξ, *hex*, six + γωνία, *gōnia*, angle). A geometric figure of six sides. When the sides and angles are respectively equal, the hexagon is said to be regular. If a regular hexagon is inscribed in a circle, each side is equal to the radius of the circle, and by joining the angular points to the centre of the circle six equilateral triangles are formed. Hence the perimeter of the circle may be divided into six equal parts by laying off in succession six chords, each equal to the radius. Each angle of a regular hexagon is equal to 120°, and the sum of all the angles of any hexagon is equal to 720°. See POLYGON; HEXAGRAM.

HEXAGONAL SYSTEM. See CRYSTALLOGRAPHY; Plate of CRYSTAL FORMS.

HEXAGRAM (from Gk. ἑξαγώνιστος, *hexagrammatos*, consisting of six letters, from ἕξ, *hex*, six + γράμμα, *gramma*, letter). MYSTIC. In 1639 Pascal, at the age of 16, published the proof of the proposition that the three pairs of opposite sides of a hexagon—or *hexagramma mysticum*, as he termed it—inscribed in a conic, intersect in three collinear points. This is a fundamental proposition of modern geometry, and its reciprocal is Brianchon's theorem, that the lines joining the three pairs of opposite vertices of a hexagon circumscribed about a conic are concurrent. See CONCURRENCE; HEXAGON.

HEXAHEDRON (from Gk. ἕξ, *hex*, six + ἔδρα, *hedra*, base). A solid geometric figure of six faces. A regular hexahedron is called a cube. The square of the edge of a regular hexahedron is one-third of the square of the diameter of the circumscribed sphere, and hence the diameter of a sphere is to the side of the regular inscribed hexahedron as $\sqrt{3}$ is to 1. See CUBE; POLYHEDRON.

HEXAMETER (Lat., from Gk. ἕξ, *hex*, six + μέτρον, *metron*, measure). The name of a verse composed of six feet or measures. The name "hexameter" usually refers to the dactylic hexameter, the heroic or epic verse of the Greeks and Romans, the best examples of which are

Homer's *Odyssey* and *Iliad* or Vergil's *Æneid*. The last foot of every verse must be either a spondee (two long syllables, as in *anno*) or a trochee (a long and a short syllable, as in *qualis*), and the penultimate must be a dactyl (a long and two short syllables, as in *tēgmīnē*). The rest may be either dactyls or spondees. Thus constructed, the verse is called dactylic. Homer offers a regular dactylic hexameter in the verse:

δewή | δὲ κλαγ | γή γένετ' | ἀργυρε | οἶο βι | οἶο.

Vergil gives this example:

Tītýrē | tū pātū | lā rēōū | bāns sūb | tēgmīnē | fāgi.

The dactylic hexameter has often been employed in modern poetry, especially in English and in German. Thus, in Longfellow's *Evangeline*, we read these lines:

This is the | forest prim | eval. The | murmuring | pines
and the | hemlocks
Bearded with | moss and with | garments | green, indus | tinct
in the | twilight,
Stand like | Druids of | old with | voices sad and pro | phetic,
Stand like | harpers | hoar with | beards that | rest on
their | bosoms.

And Klopstock's *Messias* begins with the line:

Sing', un | sterbliche | Seele, der | sündigen | Menschheit Er |
lösung.

The last line of the Spenserian stanza consists of an iambic hexameter; thus:

And often knockt his brest, as one that did repent.

See VERSIFICATION.

HEXAMETHYLENE TETRAMENE. See FORMALDEHYDE.

HEXAMETHYLENIN. See UROTROPIN.

HEXAPLA (Gk. ἑξαπλᾶ, sixfold). The name given to the work compiled by Origen for the purpose of restoring the purity of the earliest Greek version of the Old Testament, usually called the Septuagint, and bringing it into closer agreement with the original Hebrew. (See BIBLE, heading *Versions*.) It consisted of a six-column text: (a) the Hebrew text; (b) the same text transliterated into Greek characters; and the Greek translations of (c) Aquila; (d) Symmachus; (e) the Septuagint; (f) Theodotion. In case of a number of books, Origen added comparisons with three other Greek translations. The omissions in the Septuagint were generally supplied from Theodotion and marked by an asterisk, while additions in the Septuagint, as compared with the Hebrew text, were indicated by an obelisk. In consequence, however, of the neglect of these distinguishing signs in manuscripts of the Hexapla, great confusion arose, so that it has been well-nigh impossible to recover the original Septuagint text. The Hexapla, as a whole, has long been lost; several editions of those fragments which it has been possible to recover, have been printed; that by the Benedictine Montfaucón (2 vols., Paris, 1713), which retains, so far as it was retained in the manuscripts, the arrangement and even the asterisks and obelisks of Origen, long enjoyed high favor, but is now superseded by the admirable edition of Frederick Field (2 vols., Oxford, 1867-75), with additions and supplements by Pitra in *Analecta Sacra Spicilegio Solesmensi*, vol. iii (Paris, 1883). See ORIGEN.

HEXAPODA (Neo-Lat. nom pl., from Gk. ἑξάπους, having six feet, from ἕξ, *hex*, six + πούς, *pous*, foot). The name of a class of arthropods, the insects, equivalent to Insecta.

HEXATEUCH, hék'sa-tūk (from Gk. ἕξ, *hex*,

six + τεύχος, *teuchos*, implement, book). A term used to denote the first six books of the Bible, viz., Genesis, Exodus, Leviticus, Numbers, Deuteronomy, and Joshua. While *Pentateuch* (q.v.) as a title of the five books ascribed to Moses, and *Octateuch* as a designation of these with Joshua, Judges, and Ruth, go back to antiquity, *Hexateuch* is a modern term that has come into vogue chiefly through Kuenen and Wellhausen. It represents a critical view, according to which the Book of Joshua was compiled from the same sources as the Pentateuch and once formed with it a separate work. See EZRA; PENTATEUCH; and the articles on the individual books.

HEXHAM, hēks'am. A market town in Northumberland, England, on the Tyne, 21 miles west of Newcastle (Map: England, D 2). It has the interesting twelfth-century abbey church of St. Andrew, erected on the site of a structure built by St. Wilfrid about 675, the crypt of which was recently discovered. Hexham with Newcastle constitutes a Roman Catholic diocese. The manufactures consist of gloves and other goods; coal and barytes are mined, and market gardening is carried on in the vicinity. The town was the scene of a Lancastrian defeat in 1404. Pop., 1901, 7071; 1911, 8417. Consult: James Raine, *The Priory of Hexham: Its Chroniclers, Endowments, and Annals*, Surtees Society (London, 1864-65); James Hewitt, *Hexham and its Antiquities* (Hexham, 1879); Bateson and Hinds, *History of Northumberland*, vol. iii (Newcastle-on-Tyne, 1896).

HEY, hī, JULIUS (1832-1909). A German singing teacher, important for his efforts to further Wagner's views on vocal training. He was born at Irmelshausen and studied music under F. Schmitt and F. Lachner. He was introduced to Wagner by King Louis II and, in connection with the Munich School of Music, attempted a revolution of the national system of singing. His attempts failed, and on Wagner's death, in 1883, he retired from public life to complete his work on singing, *Deutscher Gesangsunterricht* (1886). Although unsuccessful in his efforts to overturn the existing methods of voice culture, Hey exercised a powerful influence on the contemporary schools of singing, and was one of the most successful practical teachers of his day. He also published a valuable book on musical interpretation, entitled *Richard Wagner als Vortragskünstler* (1908).

HEY, WILHELM (1790-1854). A German fabulist. He was born at Leina, was educated at Jena and Göttingen, and successively became pastor at Tüttelstädt (1818), court preacher at Gotha, and district church superintendent at Ichtershausen. His more famous works, issued anonymously, *Fünfzig Fabeln für Kinder* (1833) and *Noch fünfzig Fabeln* (1837), were followed by poems called *Erzählungen aus dem Leben Jesu* (1848). Consult F. Bonnet, *Der Fabeldecker W. Hey* (1885), and Theodor Hansen, *Wilhelm Hey* (Gotha, 1886).

HEYBURN, WELDON BRINTON (1852-1912). An American legislator, born in Delaware Co., Pa. After receiving an academic education he was admitted to the bar in 1876, practiced law in Pennsylvania and at Shoshone, Idaho, and, entering politics, was a delegate to the Republican national conventions of 1888, 1898, and 1900. He was defeated for Congress in 1898 by a fusion of Democrats, Populists, and Silver Re-

publicans, but in 1903 was elected to the Senate, and in 1909 was reelected for the term ending 1915. Extremely conservative in regard to innovations in methods of government, and an ardent supporter of "stand-pat" republicanism, he was especially prominent just before his death because of his opposition to a congressional inquiry into 1912 campaign contributions. He was the only Senator to be chairman of two important committees—the committee on manufactures and the joint committee on the revision of the laws of the United States.

HEYDEBRAND UND DER LASA, h'ydē-brānt unt dēr lā'zā, TASSILO VON (1818–99). A German authority on chess, born at Potsdam. He was for a time German Ambassador to Copenhagen. The possessor of one of the largest libraries on chess in the world, he wrote the *Handbuch des Schachspiels*, which appeared under the name of Bilguer, with whom he began the work, and *Leitfaden für Schachspieler* (6th ed., 1894). With Frank he edited the old Portuguese work on the game by Damiano (1857). His last work was *Zur Geschichte und Litteratur des Schachspiels Forschungen* (1897).

HEYDEMANN, h'ydē-mān, HERNICH (1842–89). A German classical archaeologist. He was born at Greifswald and studied at Tübingen, Bonn, Greifswald, and Berlin. His specialty, the study of vases, took him to Italy and Greece, and in 1869 he became instructor in archaeology at the University of Berlin. Five years afterward he went to Halle as professor of archaeology. Most of his writing was for the journals *Annali dell' Instituto*, *Archäologische Zeitung*, and *Zeitschrift für bildende Kunst*. Among his other works are: *Ungersis* (1866); *Griechische Vasenbilder* (1870); *Die Vasensammlungen des Museo Nazionale zu Neapel* (1872); *Terrakotten aus dem Museo Nazionale zu Neapel* (1882); *Dionysos' Geburt und Kindheit* (1885); *Pariser Antiken* (1887).

HEYDEN, h'ydēn, ADOLF (1838–). A German architect, born at Krefeld, pupil of Schüller in Berlin, where he worked at first independently, but after 1868 was associated with Walter Kyllmann in the erection of important structures there and in other cities of Germany. He also executed a great deal of decorative work and strongly influenced the development of industrial art by his numerous designs in this branch.

HEYDEN, AUGUST VON (1827–97). A German historical and mural painter, born at Breslau. After several years spent in mining, he gave it up for art and studied in Berlin with Holbein and Steffek and in Paris with Gleyre and Couture. His "St. Barbara, Patron Saint of Miners" was awarded a gold medal in the Salon of 1863. Among his paintings are: "The Meeting of Luther and Georg von Frundsberg at the Diet of Worms, 1521" (1866), Germanic Museum, Nuremberg; "Morning Festival" (1870), National Gallery, Berlin; "Ride of the Valkyries" (1872), owned by the German Emperor; "The Rescue of Wittich" (1880), Karlsruhe Gallery; mural decorations in the City Hall and the National Academy of Berlin, where he was professor of the history of costume from 1882 to 1893. Among his writings are: *Die Tracht der europäischen Kulturvölker* (1889); the miners' fairy tales, *Aus der Teufe* (1878), and *Die Perlen* (1881), illustrated by himself.

HEYDEN, FRIEDRICH AUGUST VON (1789–1851). A German poet, born at Nerfken, near

Heilsberg, in East Prussia, and educated at Königsberg, Berlin, and Göttingen. He wrote some dramas, unsuccessful on the stage and now forgotten, but was successful as a writer of poetic tales, the best known of which are: *Die Gallione* (1825); *Reginald* (1831); *Das Wort der Frau* (1843; 23d ed., 1881); *Der Schuster von Isphahan* (1850); *Die Königsbraut* (1851). His *Gedichte* (1852) contains his best work. Consult Alexis Gabriel, *F. von Heyden* (Breslau, 1901).

HEYDEN, JAN VAN DER (1637–1712). A Dutch architectural painter. He was born at Gorkum, where he studied with a glass painter. Then he settled in Amsterdam and began to paint views of cities, churches, and public squares. Most of the figures were supplied by Adrian van der Velde, after whose death in 1672 Heyden found less time for painting, having invented a new kind of fire engine and been appointed head of the fire department of Amsterdam. Among the six pictures by him in the National Gallery, London, are "A Street in Cologne" and the "House in the Wood, at The Hague" (where the world's first peace conference was held). Of the three in the Louvre, one illustrates the "City Hall of Amsterdam." All of his paintings are diminutive in size. He had the finest sense of perspective and paid such scrupulous attention to detail that his works are valuable as historical documents. He could not paint trees well, but had good feeling for values and atmosphere.

HEYDEN, OTTO (1820–97). A German historical and portrait painter, born at Ducherow, Pomerania. He was a pupil of Wach and Kloeber at the Berlin Academy (from 1843), then of Cogniet in Paris (1847–48), and later continued his studies independently in Italy (1850–54). Although the bulk of his work is devoted to the delineation of national history, he also painted religious subjects, genre scenes, and landscapes, besides many portraits. From his sojourn in Italy dates "Job and his Friends," Stettin Museum; followed after his return by "Foundation of Greifswald University, 1150" (1856), in the Aula of the University; "Duke Boguslav X on his Pilgrimage to Jerusalem Attacked by Pirates, 1497," Stettin Museum; "Field Marshal Schwerin in the Battle of Prague," Royal Palace, Berlin. The Austro-Prussian War, in which he took part in the suite of Crown Prince Frederick William, brought "The Battlefield of Königgrätz" (1868), National Gallery, Berlin, and three episodes in the battle of Königgrätz, all owned by the German Emperor, and several reminiscences of the Franco-German War of 1870–71, in which he also accompanied the army. "Emperor William I Visiting the Wounded," in the National Gallery of Versailles, is especially noteworthy. A visit to the East in 1869 resulted in several genre and landscape scenes from the Nile, and for the Dankeskirche in Berlin he executed the mural paintings of "The Last Supper," "The Adoration of the Magi," and "The Resurrection" (1883).

HEYDRICH, h'ydrik, GUSTAV MORITZ (1820–85). A German poet, born at Dresden and educated at Leipzig and at Berlin. His principal works are the tragedies *Tiberius Gracchus* and *Leonore von Portugal* (1861); the farce *Prinz Lieschen* (1861); and a collection of poems, *Sonnenschein auf dunklem Pfade* (1869).

HEYDT, hit, AUGUST, BARON VON DER (1801-74). A Prussian administrator. He was born at Elberfeld, where with his two brothers he carried on the banking business founded by his father. After an extended trip through England and France he was elected a deputy in 1847 and a member of the National Assembly in 1848. In the latter year he became Minister of Trade. Three years afterward he was made director of the Prussian Bank. His cabinet post he held through the period of reaction, as his politics were not extremely radical. In 1862 he became Minister of Finance in the Hohenlohe-Itzenplitz cabinet and attempted to please both sides in the growing conflict between crown and legislature. He retired on Bismarck's assumption of control later in the year, but was recalled in 1866 to the same post to face the question of raising funds for the war with Austria. He clashed with the Diet, but held his place until 1869.

HEYDUK, hī'duk, ADOLF (1835-). A noted Czech poet, born at Reichenburg and educated at Brünn and Prague. After 1860 he was professor in the Realschule at Pisek. Heyduk draws his inspiration from folk poetry. His poems, mostly lyric, but many in the idyllic manner, include among others: *Lesní květy* (Forest Flowers, 1875); *Děnorubec* (The Wood Cutter, 1882); *Cymbal a husle* (1876), which deals with the Slovaks; *Pisně* (Songs, 1885); *Zaváté listy* (Blown Leaves, 1886); *Na vlnách* (On the Waves, 1890); *Bohatýř* (Heroes, 1894); *Dědův odkaz* (Grandfather's Bequest, 1880).

HEYER, h'ēr, GUSTAV (1826-83). A distinguished German forester, son of Karl Justus Heyer (q.v.). He was born at Giessen and studied at the University of Giessen, where at the age of 27 he became professor of forestry. In 1868 he was appointed director of the Academy of Forestry at Münden, a post which he resigned in 1878 to accept a professor's chair in the University of Munich. From 1856 to 1878 he edited the *Allgemeine Forst und Jagdzeitung*. Among his many works on forestry may be mentioned: *Lehrbuch der forstlichen Bodenkunde und Klimatologie* (Erlangen, 1856); *Anleitung zur Waldverrechnung* (4th ed., Leipzig, 1892); *Handbuch der forstlichen Statik* (ib., 1871).

HEYER, KARL JUSTUS (1797-1856). A noted German forester. He was born at Besungen near Darmstadt, studied at Giessen and at Tharand, and at the age of 21 took active part in practical forestry, especially in the vicinity of Darmstadt, where he was then lecturing on forestry. In 1825 he was appointed instructor in the school of forestry at the University of Giessen, where, after having been also practical forester for Count Erbach-Fürstenauf for four years, commencing in 1831, he became professor of forestry in 1835, a post he held until his death. During his incumbency he made many interesting contributions to the subject of forestry, in recognition of which a monument was erected in his honor at Giessen in 1892. Among his works may be mentioned: *Beiträge zur Forstwissenschaft* (Giessen, 1842 and 1847); *Anleitung zu forststatistischen Untersuchungen* (ib., 1846); *Der Waldbau oder die Forstproduktenzucht* (Leipzig, 1854; 4th ed., by Richard Hess, 1891-93).

HEYLLI, ā'yē', EDMOND-ANTOINE POINSOT, called GEORGES D' (1833-1902). A French bib-

liographer and editor. He was born at Nogent-sur-Seine and in 1877 became chief of the Bureau of the Legion of Honor. He is best known as a collector of anecdotes about celebrities, Louis XV, Countess du Barry, Mademoiselle Émile de Girardin, Marshal Ney, Madame Rachel, and others, and published a number of books, such as *Le scandale au théâtre* (1864); *Dictionnaire des pseudonymes* (1867), of which a third and enlarged edition came out 20 years later. He founded (1876) the *Gazette Anecdotique, Littéraire, Théâtrale*, brought out curious editions of *Manon Lescaut* and of *Paul et Virginie*, and collected a number of interesting documents relating to the War of 1870 and the Commune.

HEYLYN, hī'lin, or **HEYLIN**, PETER (1600-62). A Church of England divine. He was born at Burford in Oxfordshire, Nov. 29, 1600. He studied at Oxford and through the interest of Laud, in whose theory of church and king he devoutly believed, was appointed chaplain in ordinary to King Charles in 1630. Subsequently he held a variety of livings, but was deprived of them during the period of the Commonwealth and lived in poverty and partial blindness, but continued his bitter anti-Puritan controversies. At the Restoration he was made subdean of Westminster as a reward for his literary services to the royal cause. He died in London, May 8, 1662. Heylyn was a very voluminous controversial writer, but his works are of no value now, except as illustrative of the age in which he lived and the High Church Royalist party to which he belonged. For his life, consult Robertson in his edition of Heylyn's *Ecclesia Restaurata*, where the *Life* of his son-in-law, Barnard, is reprinted (London, 1849).

HEYN, or **HEIJN**, hin, PIET (1578-1629). A Dutch admiral. He was born at Delftshaven, near Rotterdam. In 1624 he engaged and utterly defeated the Portuguese in All Saints Bay, Brazil, and returned to Holland with an immense booty. Only two years after this he captured, in the Bay of Matanzas, almost without a blow, the grand Spanish silver flotilla, the value of which was estimated at 12,000,000 Dutch guilders. As a reward, he was named admiral of Holland, in 1629. Shortly after, he met his death in a naval encounter off Dunkirk.

HEYNE, h'ēne, CHRISTIAN GOTTLÖB (1729-1812). A German classical scholar, born at Chemnitz in Upper Saxony. His father was a poor weaver. The pastor of Chemnitz, himself very poor, had Heyne educated at a school in the suburbs, and afterward sent him to the University of Leipzig, where he suffered from extreme poverty. In 1753 he obtained a situation as copyist in the library of Count von Brühl, then Prime Minister, at Dresden. While in this office, he prepared his edition of *Tibullus*, which appeared in 1755 and roused the admiration of Ruhnken, of Leyden. In 1756, unfortunately for Heyne, the Seven Years' War broke out. Frederick the Great marched against Dresden and burned, among other things, the Brühl library, but not before Heyne had edited, from a *codex* there, the *Enchiridion* of Epictetus; an edition of Lucian, however, which he had nearly completed, was destroyed. For some time he led a precarious life, being often without employment and without bread. In 1761 he married and supported himself as best he could by writing for the booksellers; in 1763 he was appointed professor of rhetoric at Göttingen on the recommendation of Ruhnken. This closed his

period of misfortune. The rest of his long life was spent in comfort and professional activity. The principal works of Heyne, besides those mentioned, are his editions of Vergil (1767; 6th ed., 1803), Pindar (1774), Apollodorus (1787), Pliny (1790), Oson and Parthenius (1798), and Homer (8 vols., 1792; 2d ed., 1804). He published many translations, besides some 10 or 12 volumes of minor works, of which six volumes were published separately under the title of *Opuscula Academica* (Göttingen, 1785-1812); and, finally, a great many reviews of books, etc. (7000 pieces or more in all) in the *Göttinger gelehrte Anzeigen*, of which he was editor from 1770. In addition to this work he had a seminar for the advanced study of philology and classical antiquity, from which he sent forth no fewer than 135 professors. Consult: the Life of Heyne by his son-in-law, Ludwig Heeren (Göttingen, 1813); Hermann Sauppe, *Göttinger Professoren* (ib., 1872); Carlyle's essay, *On the Life of Heyne*; J. E. Sandys, *History of Classical Scholarship*, vol. iii (Cambridge, 1908).

HEYNE, MORITZ (1837-1906). A Germanic philologist. He was born at Weissenfels, studied at Halle, and became instructor there in 1864, and assistant professor in 1869. In the following year he went to Basel as professor of German language and literature and in 1883 was called to a similar chair at Göttingen. His most widely known work is that in the continuation of Grimm's *Deutsches Wörterbuch* (in which he edited the letters H, I, J, L, M, R, and part of S) and his own *Deutsches Wörterbuch* (1890-95). More important possibly is his work in phonetics and old Germanic literature: *Kurze Laut- und Flexionslehre der allgermanischen Dialekte* (3d ed., 1880); *Altächsische und altniederfränkische Grammatik* (1873); editions of Beowulf (6th ed., 1898; also a metrical translation of Beowulf, 1898); a translation of the Ruodlieb (1897); of the Heliand (3d ed., 1883); and *Altdeutsch-lateinische Spielmannsgedichte des zehnten Jahrhunderts* (1900); and in antiquities, *Kunst im Hause* (1881-83) and *Fünf Bücher deutscher Hausaltertümer* (1899-1901, the first two parts). Posthumously appeared *Das altdeutsche Handwerks* (1908).

HEYNLIN, HIN'LEN, JOHANN (c.1425-96). A prominent theologian and humanist of the fifteenth century, variously called a *Lapide* and *Lapidanus*. He studied at Leipzig, Freiburg, Basel, and at Paris, where in 1468 he was made rector of the university and in the same year and in 1470 prior of the Sorbonne. After teaching at Basel and the new University of Tübingen (1478), he was preacher in the cathedral of the former city (1484), but retired to a cloister three years afterward. With Fichet he introduced the art of printing in Paris (1470). Consult Friedrich Fischer, *Johannes Heynlin, genannt a Lapide* (Basel, 1851).

HEYNRICH, HIN'RIKS, J. N. The pseudonym of the German author and reformer Jenny Hirsch (q.v.).

HEYSE, H'ZE, JOHANN CHRISTIAN AUGUST (1764-1829). A German grammarian and lexicographer, born at Nordhausen and educated at Göttingen. He taught at Oldenburg, in his native town, and in Magdeburg. His writings, practical rather than scholarly in nature, are: *Allgemeines Fremdwörterbuch* (17th ed., 1892); *Deutsche Schulgrammatik*, under the new title *Deutsche Grammatik* (26th ed., by Lyon, 1900);

Leitfaden zum Unterricht in der deutschen Sprache (27th ed., 1904).

HEYSE, KARL, WILHELM LUDWIG (1797-1855). A German philologist, son of Johann Christian August Heyse, father of the German novelist Paul Heyse, born at Oldenburg. In 1816 he began his studies of philology and linguistics under Böckh and Bopp at Berlin, where he became assistant professor of philosophy in 1829. His work at first was mainly in Latin and Greek, but after his father's death he took up German as well, and revised many of his father's works, especially the *Allgemeines Fremdwörterbuch*. His own works are: *Handwörterbuch der deutschen Sprache* (1833-49), both practical and scholarly; *Ausführliches Lehrbuch der deutschen Sprache* (1838-49), popularizing the results of historical and comparative linguistics; and *System der Sprachwissenschaft*, his most important work, edited by Steinthal (1856).

HEYSE, PAUL (1830-1914). A distinguished German author, the son of Karl Wilhelm Ludwig Heyse, the lexicographer (q.v.), and Julie Salomon, a distant relative of Felix Mendelssohn. He was born in Berlin and was educated there and at Bonn, where he began to specialize in Romance languages and literatures under Diez. A stipend of 500 thaler enabled him to spend the year 1852-53 in study and travel in Italy. Even earlier, however, he had made his first dramatic effort on a subject which the Romantic revival had made very popular, *Francesca da Rimini* (1850). A little later appeared his epics, *Die Brüder* (Berlin, 1852) and *Ulrica* (ib., 1851), which, when they were republished in 1854, aided Geibel (q.v.) to secure Heyse's call to Munich (1854), to join the galaxy of poets at the court of King Maximilian. Here he made his home for the rest of his life, with frequent visits to Italy, whose culture influenced all his writing deeply. In later life he spent much of his time in Italy on the banks of Lake Garda. He was ennobled in 1910 and in 1911 was awarded the Nobel prize for literature. He died in April, 1914. The sum of Heyse's many and varied productions has made him a dominant figure among German men of letters. His prose fiction has been chiefly in the shape of short stories (about 165 in number), for which he came to hold a high position in German letters. These tales are models of their kind, masterpieces in miniature, canons in which every line leaves an impression. The best collection of them is *Das Buch der Freundschaft* (1883); the most famous single example is *L'Arrabbiato* (1853). He also produced a few longer novels, tinged with radical thought on social and religious questions, especially: *Kinder der Welt* (1873); *Im Paradiese* (1875); and *Ueber allen Gipfeln* (1895), pessimistic in tendency, but fresh in style and gracefully light in movement. A large number of lyric and epic poems testify to a ripe culture, a warm imagination, and a suavity of expression which at times sacrifices strength to sweetness. The best known of his longer poems is the epic *Thekla* (1858). In his dramas (about 60 in number) he set himself a high standard, although he has not in any of them attained the highest dramatic rank. They lack genuine dramatic action. *Die Sabinerinnen* (1859), *Ludwig der Bayer* (1862), and *Hans Lange* (1866) are noteworthy among his plays; his later work includes *Maria von Magdala* (1899), *Das verschleierte Bild zu Sais* (1901), *Der Heilige*

(1902), *Ein Kanadier* (1905), and *Die Tochter der Semiramis* (1905), the first of which had a pronounced American success in 1902. Dramatic sketches from ancient life appeared, as *Mythen und Mysterien* (1904). In collaboration with Kurz and Laistrer he collected and edited *Der Novellenschatz des deutschen Volkes* (1871 et seq.), a large collection of the best German short stories, and *Der Novellenschatz des Auslands*, a similar collection of short stories in other tongues. The latest edition of his novels appeared in 12 volumes (1902-12), of his short stories in 24 volumes (1904-10). His dramatic writings are contained in 34 volumes (1864-1903). His reminiscences, *Jugenderinnerungen und Bekenntnisse*, appeared (vol. i) in 1901; vol. ii in 1912. Consult: Georg Brandes, *Moderne Geister* (Frankfort, 1887); Otto Kraus, *Paul Heyse's Novellen und Romane* (ib., 1888); Friedrich Kummer, *Deutsche Literaturgeschichte des 19. Jahrhunderts* (Dresden, 1909); Erich Petzet, *Paul Heyse als Lyriker* (ib., 1913); A. H. Biese, *Deutsche Literaturgeschichte* (Munich, 1913).

HEYWARD, hä'wërd, THOMAS, JR. (1746-1809). An American jurist, one of the signers of the Declaration of Independence. He was born on the estate of his father, a wealthy planter of St. Luke's, S. C., and was educated in his native parish and in London, where he went to finish his law studies. His observations there and in other parts of Europe sent him home with strong republican ideas. From 1775 to 1778 he represented North Carolina in the Continental Congress; he became a judge of the civil and criminal court in his native province in 1780, was a captain of artillery in the war, and became a prisoner of the British at the surrender of Charleston. He was a member of the State convention for framing a constitution in 1790 and retired into private life the following year.

HEYWOOD, hä'wüd. A town and municipal borough in Lancashire, England, on the Roach, 9 miles north of Manchester (Map: England, D 3). It owes its present enterprise to the father of the first Sir Robert Peel, who first introduced manufactures. It is an important centre of the cotton manufacture, has extensive iron and brass foundries, boiler-making, steam-locomotive, and chemical works. It possesses handsome churches and other fine buildings. Coal is mined in the neighborhood. The municipality provides water, gas, markets, baths, fire brigade, technical school, free library, hospital, cemeteries, and owns a spacious park and recreation ground. It was incorporated in 1881. The corporation is composed of a mayor, six aldermen, and 18 councilors. Pop., 1901, 25,458; 1911, 26,697.

HEYWOOD, JOHN (c.1497-c.1580). An English author, sometimes called "The Old Epigrammatist." The place of his birth has not been definitely ascertained, but it was probably London or North Mimms, Hertfordshire. At an early age he came to court, introduced, according to some traditions, by Sir Thomas More; and the "Book of Payments" of Henry VIII shows him to have been in the royal service in 1515, probably as a singer and a player on the virginals. He found great favor at the courts of Edward VI and Mary, where his quickness at repartee and his witty imagination, besides the literary flavor of his writings, made him the superior intellectually of the usual court jester. Shortly after the accession (1558) of Queen Elizabeth, he withdrew to Malines, Belgium. Of

his literary remains the first chronologically were five *Interludes*, printed between 1533 and 1569. There are frequent plagiarisms from Chaucer; but they contain some original humor and vigorous satire, and the semidramatic form in which they are cast places them among the precursors of English comedy. A more ambitious but less successful production was *The Spider and the Flie*, which was printed in 1556. Written partly as a compliment to Queen Mary for her theological attitude, it represented Roman Catholics as the flies and Protestants as the spiders, with the Queen as the housemaid wielding her destroying broom. His best-known and most popular writings were the *Epigrammes*, the first extant edition of which bears the date 1562. The *Interludes* included: *A mery Play between the Pardoner and the Frere, the Curate and Neybour Pratte* (1533); *A mery Play between Johan the Husbnde, Tyb the Wife, and Syr Han the Priest* (1533); *The Four P's* (1569); *The Play of the Wether* (1533); and *The Play of Love*. His other works besides those mentioned were *A Dialogue on Wit and Folly* (reprinted in 1846) and another dialogue larded with proverbs and epigrams (reprinted in 1867), both of which appeared in 1562, and several ballads. Consult: J. O. Halliwell, *Dictionary of Old English Plays* (London, 1860); Sharman's Introduction to an edition of the *Proverbs* (ib., 1874); J. A. Symonds, *Shakspeare's Predecessors in the English Drama* (new ed., New York, 1900); *Dramatic Writings of John Heywood*, edited by J. S. Farmer for the Early English Drama Society (London, 1905).

HEYWOOD, THOMAS (c.1575-c.1650). A celebrated English dramatist and general writer, born in Lincolnshire. He seems to have studied at Cambridge. By 1596 he was apparently writing for the stage, and two years later he was engaged by Philip Henslowe as an actor. Heywood was a most prolific writer. In 1619 he became one of the Queen's players. In 1633 he claimed to have had "an entire hand, or at the least a main finger," in 220 plays. His career was not yet ended. Of these plays only 24 are extant. The best of them is a domestic drama entitled *A Woman Killed with Kindness*, performed in 1603. This play brings us close to the heart of English middle-class life. Somewhat similar to it is *The English Traveller* (1633). Representative of his work in low life is *The Wise Woman of Hogsdon* (1638). There are three admirable comedies of adventure: *The Captives* (ed. by Bullen, 1885), *The Fair Maid of the West*, and *Fortune by Land and Sea*. Besides his 220 plays, Heywood wrote many pageants, triumphs, elegies, a long heroic poem entitled *Troia Britannica*, a universal chronicle history (1609); *An Apology for Actors* (1612; reprinted for the Shakespearean Society, 1841); *Nine Books of Various History Concerning Women* (1624); *The Hierarchy of the Blessed Angels* (1635); and much else. He also made translations from Sallust, Lucian, Erasmus, and others. He died about 1650. Consult: *Dramatic Works* (ed. by Pearson, 6 vols., London, 1874); *Thomas Heywood*, a selection from his plays (ed. by J. A. Symonds and A. W. Verity, "Mermaid Series," ib., 1888); *Old English Plays* (ed. by Bullen, vol. iv, ib., 1885); Ward, *History of English Dramatic Literature* (New York, 1899); *The Best Plays of Thomas Heywood* (ed. by A. W. Verity, ib., 1904).

HEZEKIAH (Heb. *Khizkiyāh*, Yahwe is my

strength). King of Judah, son of Ahaz. His reign may be approximately fixed as extending from 715 to 686 B.C. He ascended the throne at an early age—probably less than 20 and appears to have been early influenced by the discourses of the prophet Isaiah, through whom it is supposed that he was induced to remove from the cult at Jerusalem certain practices, such as the worship of the brazen serpent (2 Kings xviii. 3, 4). We possess but little authentic information about Hezekiah's reign. The most important event was an invasion of Palestine by Sennacherib (q.v.), King of Assyria (701 B.C.). With the help of the cuneiform annals of Sennacherib we can obtain a tolerably clear idea of this campaign, which was undertaken to offset the efforts of the Chaldean King, Merodach-Baladan (cf. 2 Kings xx. 12–19), to make alliances with nations to the west whom Assyria claimed as vassals. Hezekiah and other rulers, such as the chiefs of the Philistines, of Edom, and of Moab, promised Merodach-Baladan aid in making Babylon independent of Assyria. Sennacherib, after overthrowing Merodach-Baladan, proceeds to the west to wreak vengeance on Hezekiah and his allies. He succeeds in quelling the uprising and removes those who had shown themselves faithless to him. Sennacherib advances within a few miles of Jerusalem, but, after exacting a heavy tribute, withdraws without capturing the Judean capital (2 Kings xviii. 13). The King of Ekron, Padi, who had been sent to Hezekiah in chains by the war party, is handed over to Sennacherib, who restores him to his throne. The tribute is forwarded by Hezekiah to Nineveh. The probable reason for the withdrawal was the receipt of news of the insurrection of Belshazzar in Babylonia, which obliged Sennacherib to return to his land, content with having once more made his authority recognized in the west. It is not considered probable that after this Hezekiah ventured on any campaigns, so that the account (2 Kings xviii. 8) of a successful conflict with the Philistines is probably to be placed at the beginning of his reign. Many scholars maintain that it was on a subsequent expedition, nearer the end of Sennacherib's reign, that the catastrophe to his army occurred to which allusion is made in 2 Kings xix. 35, where the angel of Yahwe is said to have smitten 185,000 men, and also in Herodotus (ii. 141), where Sennos is said to have been delivered from an attack by Sennacherib, King of the Arabians and the Assyrians, by a multitude of field mice devouring all the quivers, bowstrings, and shield thongs, so that the unarmed host had to flee on the next morning. Sennos is probably another name for Tihaka, who began to reign c. 689 B.C. A recently published inscription of Sennacherib refers to an invasion of Arabia after the destruction of Babylon in 689 B.C. From certain notices (e.g., Proverbs xxv) it would appear that in his days considerable literary activity prevailed, though it is highly improbable that the King himself wrote anything. The song in Isaiah xxxviii, ascribed to the King as having been composed by him after a severe illness, belongs to the postexilic period, on the evidence of the language and contents, and the entire story of this illness is probably a bit of legendary lore that has found its way into an historical narrative because it served to illustrate the view taken by a later age of Hezekiah, who had become idealized like David and Solomon into a model King. Consult the

histories of Israel and the commentaries on the Books of Kings and, especially for the second invasion of Sennacherib, Rogers, "Sennacherib and Judah," in *Studien Julius Wellhausen gewidmet* (Giessen, 1914).

H. H. The initials denoting the authorship of Helen Hunt, *née* Fiske. See JACKSON, HELEN E. H.

HIAWATHA, hi'ā wā'thā. A city and the county seat of Brown Co., Kans., 10 miles north-west of Atchison, on the Missouri Pacific and the St. Joseph and Grand Island railroads (Map: Kansas, G 3). It has Hiawatha Academy and the Morrill Public Library, in a Carnegie library building. The city is chiefly important as the commercial centre of a fertile agricultural country, and has lumber yards, grain elevators, a flour mill, foundries, machine shops, etc. There are municipal water works and two electric light plants, one of which is owned by the city. Hiawatha adopted the commission form of government in 1914. Pop., 1900, 2829; 1910, 2974.

HIAWATHA. A narrative poem by Henry Wadsworth Longfellow, founded on an Indian legend preserved in Schoolcraft's *Algonic Researches*, and *History, Condition, and Prospects of the Indian Tribes of the United States*. However, the miraculously born hero is declared to be an Iroquois and not an Ojibway, according to other sources. Longfellow adopted the metre of the Finnish epic *Kalevala* and was accused of taking the entire plan from that poem. But the incidents common to both show merely the recurrence of early myths.

HIBBARD, FREEBORN GARRETTSON (1811–95). An American Methodist Episcopal clergyman, born at New Rochelle, N. Y. He was the eighth son of the famous and eccentric Billy Hibbard. Entering the ministry in 1830, he served four terms as presiding elder and was a member of six general conferences; was editor of the *Northern Christian Advocate*, Syracuse, N. Y., for four years; and was the author of 10 volumes, the most important of which are: *Christian Baptism* (1841; 23d ed.); *Palestine: Its Geography and Bible History* (1850); *The Psalms Chronologically Arranged, with Historical Introductions* (1857); *The Religion of Childhood* (1864); and a biography of the Rev. Leonidas L. Hamline (1880).

HIBBEN, JOHN GRIER (1861–). An American university president. He was born at Peoria, Ill., and in 1882 graduated from Princeton University (Ph.D., 1893). He also studied at Princeton Theological Seminary and at the University of Berlin. Ordained to the Presbyterian ministry in 1887, he was thereafter pastor at Chambersburg, Pa., until 1891. He then took up the teaching of logic at Princeton, where he was professor from 1897 until 1912, when he was chosen president of the university. Besides editing the *Epochs of Philosophy* (12 vols.), he is author of *Inductive Logic* (1896); *The Problems of Philosophy* (1898); *Hegel's Logic* (1902); *Deductive Logic* (1905); *The Philosophy of the Enlightenment* (1909); *A Defense of Prejudice, and Other Essays* (1911).

HIBBERT LECTURES, THE. A course of lectures given annually in London, discussing some unsettled problem in religion or theology. The lectures are supported from a fund left by Robert Hibbert, a Jamaica merchant, who died in 1840, leaving his property in trust for the promotion of scholarship, particularly among Unitarians. By a wise provision the trustees were empowered to revise the terms of adminis-

tration from time to time, and in the exercise of this power they established the lectures in 1878. The first series was delivered in that year by F. Max Müller on "The Origin and Growth of Religion," and succeeding series have been given by Kuenon, Beard, Reville, Page Renouf, Renan, Rhys Davids, Pfeiderer, Rhys, Sayce, Hatch, Montefiore, Drummond, Farnell, and others. The lectures are published, and many of them are of great importance for the history of religion. The *Hibbert Journal* is also supported in part by the same fund.

HIBBING. A village in St. Louis Co., Minn., 84 miles northwest of Duluth, on the Duluth, Missabe, and Northern and the Great Northern railroads (Map: Minnesota, E 3). It is situated in the famous Mesaba Iron Ore Range (see Iron), which has since 1892 produced more than 282,000,000 long tons. In 1912 the output was 32,600,000 tons, a considerable increase over the previous year, and more than 59 per cent of the total production of the United States. Within the village limits there are five of the country's largest mines. The water works and electric-light plant are owned by the municipality. Pop., 1900, 2481; 1910, 8832; 1914 (U. S. est.), 12,211.

HIBERNACULA, hī'bēr-nāk'ū-lā (Lat. nom. pl., tents for winter quarters). A term often applied to the winter buds of certain aquatic plants, such as the bladderwort (*Utricularia*). They are heavier than water, and, being developed at the approach of cold weather, they become detached, sink to the bottom of the pond, and thus survive the winter. In the spring they enlarge, developing air spaces, rise to the surface, and reproduce their species. See **BLADDERWORT**.

HIBERNATION, hī'bēr-nā'shūn (Fr. *hibernation*, *hivernation*, from Lat. *hibernare*, to hibernate, from *hibernus*, winter, from *hiems*, winter, (ik. *хуа́н*, *chiōn*, Skt. *hima*, Av. *zima*, winter), AND **ESTIVATION** (Fr. *estivation*, from Lat. *æstivare*, to pass the summer, from *æstivus*, pertaining to the summer, from *æstus*, summer; connected with Lat. *æstus*, heat, Gk. *αἶθερ*, *aithein*, to burn, AS. *ād*, funeral pile, Skt. *idh*, to kindle). A physiological state of dormant vitality in which many animals in northern countries are able to pass the winter. It should not be confused with the torpor of freezing, which is a pathological and usually a fatal condition. The immediate cause of hibernation is not cold, for many animals go into their winter sleep some time before winter is on. Nor is it the lack of food, for the great bat begins sometimes to hibernate as early as the end of July, at a time when its insect food is still abundant. Moreover, the winter season is not the only one passed by animals in this kind of torpor. In dry countries, at the approach of the dry season, when moisture, herbage, and consequently animal food will be scarce, many kinds of animals are enabled to survive until the time of plenty again by going into a prolonged stupor, which seems not to be very different in kind or duration from the hibernation of northern forms. The Germans have for these two conditions the words "Winterschlaf" (winter sleep) and "Sommerschlaf" (summer sleep). The latter state is known in English as *estivation*.

Dormant Vitality, or rigor, is a term used for an apparent suspension of vital activity, distinguished from death by the possibility of resuscitation. Two general classes may be distinguished: (1) dormant vitality induced by

external conditions; and (2) dormant vitality determined by internal conditions. The first class is of three kinds: (a) *Desiccation rigor*. There are certain animals, notably rotifers, tardigrades, and nematodes, which can be dried in a vacuum until they become immobile and can remain thus immobile for days or even months until, on the addition of water, they become active again. The organism has probably not lost all of its water, but has passed into an encysted condition; it is not dead, but its metabolism is greatly reduced. Even snails and other animals which can protect their internal tissues from complete loss of water may live for months without showing external activity. (b) *Dark rigor* is induced in green plants and even in certain fungi by their removal for several days from the light. The sensitive plant treated thus becomes immobile. Light is essential to movement. The reverse, or "light rigor," has been seen in bacteria. (c) *Heat rigor*. The sensitive plant, muscle, and various other forms of protoplasm become quiescent at a temperature a few degrees below that at which they are killed by heat. The rigor seems to be due to the beginning of the death changes. Cold rigor occurs in simple protoplasm as it approaches the zero (centigrade) temperature. The chlorophyll granules of *Vallisneria* move only about 1 millimeter per minute at 1° C. and not at all at 0°; the rotation of *Nitella* ceases at 0° C. in *Tradescantia* hairs, movement is wholly arrested on freezing the cell cap. Even in seeds and bacteria, which are not killed by the lowest temperatures, all vital activities have probably ceased at 0°, for De Candolle found that in only one species out of 10 could he get a seed kept at 0° to germinate, and even then germination was so retarded that it took from 11 to 17 days as opposed to 4 days at 5.7°. Likewise, bacteria do not multiply below 5° to 10°. Among animals Kuhne found *Amoeba* cooled to near 0° almost motionless. Purkinje and Valentin first noticed that the ciliated epithelium of the frog ceased its movements at 0°. Muscles of the frog were found by Kuhne to become at -3° to -7° a solid lump, which did not, however, wholly lack irritability. The evidence of all these cases shows that activity nearly ceases in protoplasm at or near 0° C.

Determined by internal conditions, seeds, resting spores, cysts, gemmules of sponges, and statoblasts of *Bryozoa* are all conditions of natural dormant vitality. The period of dormancy is not unlimited, however, the alleged germination of seeds many hundred years old not being confirmed. This indicates that even with a slow rate of living the food material eventually becomes exhausted.

Belief in human dormancy rests largely upon a certain collection of cases observed in India and published by James Braid.

Phenomena of Hibernation and Estivation. The physiological facts mentioned above must be considered in studying the phenomena of habitual animal dormancy under conditions of winter, seasons of drought, and so on. The respiration in winter sleep is diminished much more than in ordinary sleep, and consequently the heart beat is very slow. The digestive organs are practically inactive. Many animals void almost no feces during this period, and the anal opening of those bears that hibernate is closed by a resinous plug known to hunters as the seal. The temperature of the body is lowered to that or nearly that of the air. The voluntary control of

muscles is lost, but there is an increased muscular irritability, an unusual sensitiveness to external stimuli. The slightest touch possible, even on the end of a quill of a hibernating porcupine, will result in deep breathing and perhaps muscular movements. There can be no sharp line drawn between normal sleep and the lethargy of hibernation, for there are all gradations in the depth and duration of this lethargy, beginning at one end of the scale with what might perhaps be simply termed sleep, and ending with animals that do not once wake up from the hibernating stupor until the time for its final termination has come.

Nearly all of the burrowing rodents are hibernators, especially, in the United States, the woodchuck. A number of animals indulge in alternate periods of waking and hibernation. The English squirrel, the hedgehog, and the mourning-cloak butterfly are frequently awake on warm days in winter. Grain-storing animals spend a great deal of their time in sleep, but when hungry they awake to partake of their food properly or go outside in search of fresh food if weather permits. In the case of the northern brown, black, and polar bears only the female hibernates in the strict sense of the word, probably because she must remain quiet until her young is born, often before the snow releases her. The males sleep a great deal, but they go out now and then in search of food. A number of animals of wide range of distribution hibernate in the northern but not in the southernmost parts of their range. Such is the case with the American prairie dogs and the skunk. In the centre of their range they are awake and active during warm winters or warm days in winter. Thus, there are all degrees of torpidity, and likewise adaptations between ordinary periodical sleep and hibernating dormancy. Although we cannot understand why animals of one species could be active in winter while those of a nearly related species should hibernate, as is the case among mice, nevertheless, it is probably of advantage in the struggle for existence, since it enables animals to remain in certain geographical areas in which they could not possibly survive without long and perilous migrations twice each year. This is especially true of the small vegetable-eating animals of northern plains.

Mammals usually hibernate in hollow logs, in caves, in caverns, or even in burrows in the ground. Usually their winter homes are made additionally fitting by a bed or nest of dry grass and autumn leaves. Most of the hibernators are tireless or in part vegetable feeders. All the grain-storing species are active all winter, or else are intermittent hibernators.

Reptiles, amphibians, and some fishes hibernate. The land reptiles and amphibians bury themselves in the ground below frost line and there remain until spring. Aquatic species, such as the water turtles, burrow in the mud at the bottom of streams. A few fishes, such as carp, eel, minnows, and cels, likewise lie throughout the coldest part of the winter in the mud and bris at the bottom of the water. Various snakes crawl into crevices between rocks, or into hollows beneath stumps, or take possession ofopher burrows and the like, or even burrow themselves into loose soil, and pass the winter there wrapped in a tangled mass composed of oes of individuals of the same species. The temperature of these sinks to that of the water mud in which they lie; and those of a northern

habitat can endure a stress of cold to which individuals of the same species living in a warmer region will succumb.

Among the invertebrates land snails hibernate within their closed shells. They also afford the most conspicuous American example of estivation. When the dry, hot weather of midsummer approaches, many species secrete two or three diaphragms across the aperture of their shells and behind these remain as torpid as in winter until tempted out by a prolonged shower, until the autumn coolness and dampness arrive. Slugs bury themselves in the ground, and the bivalve mollusks in the mud at the bottom of streams and ponds. A great many of the other land invertebrates survive as eggs or spores which remain inactive during the winter and begin to develop on the return of spring. Spiders, more or less active, hide under fallen leaves or bark and in other secluded places. Insects pass the winter in all stages of development. A number of beetles, flies, bugs, and a few butterflies winter as adults in northern climates. A large number of butterflies and moths pass the winter as pupae, frequently protected by a silken cocoon. Several kinds of caterpillars are able to survive the winter either in spun nets or in sheltered hollows or chinks. A vast host of insects survive as eggs, whose development is delayed until spring.

Upon waking from their stupor the heat of the body of hibernating animals very quickly increases to the normal. Hunger is probably the chief agent that calls such animals to activity again. The most profound sleepers can scarcely be kept awake when brought into a warm room and stimulated. Partial hibernators, after a hearty meal in winter, resume their torpor again. The air under a bell jar, in which a hibernating dormouse is put, remains unchanged. A bat kept a hibernating bat under water 15 minutes without fatal effect, while a awakened bat will succumb after three minutes. Carbon dioxide, which is speedily fatal to active animals, has no effect on a torpid marmot. Hibernators lose their weight in winter to the extent of 30 to 40 per cent. This loss of weight indicates that, notwithstanding their great diminution, the vital processes are going on in the hibernating animal all the time.

Consult: Hall, "Hibernation," in Todd, *Cyclopedia of Anatomy and Physiology*, vol. ii (London, 1838); Browne, *Animal Torpidity and Hibernation* (Philadelphia, 1847); Semper, *Animal Life* (New York, 1881); Gadow, Beddard, Sharp, and other writers in the *Cambridge Natural History* (London, 1895-1903).

HIBERNIA, hī-ber'nī-ā, **IVERNA**, i-vēr'nā, **JUVERNA**, jā-vēr'nā, or **IERNE**, i-ēr'nē (probably connected with Welsh *Ywerddon*, M.Bret. *Ywardon*, Ir. *Erin*, *Herin*, Ireland, akin to Gk. *Ἰερίη*, *Pieria*, name of a district in Greece, Skt. *pīvan*, fat; cf. also MWelsh *Ewgyrdonic*, Irish). Names by which Ireland is designated in the classical writers. Aristotle speaks of two islands situated in the ocean beyond the Pillars of Hercules, which were called "Albion, and Ierne, beyond the Celts." Both Diodorus Siculus and Strabo report the natives to be addicted to cannibalism, but without proof. Pomponius Mela declares the herbage to be so luxuriant that the cattle which feed on it sometimes burst. Pliny repeats this statement and adds that the Hibernian mother trains her child from the very first to eat food from the point of a sword. The

most important of all classical authorities on Hibernia is Ptolemy, who describes the country and gives the names of the principal rivers, promontories, seaports, and inland towns. The island was never conquered by the Romans. See IRELAND.

HIBERNIANS, ANCIENT ORDER OF. A prominent Catholic Irish organization. The society was instituted originally for the protection of the Catholic priesthood and religion in Ireland, but it has now for its main object "the advancement of the principles of Irish nationality." According to some authorities the order was first instituted in 1642, following the great uprising in the north; according to others, in 1651, when Cromwell had proclaimed nearly the whole native population outlawed and had put a price upon the head of every priest and made it death to attend a Catholic service. The founder was Rory O'Moore, and the society was at first known as *The Defenders*. On the establishment of Catholic emancipation, in 1829, the society was reorganized under its present name as a beneficial and Nationalist organization. It was soon afterward extended to England and Scotland, was introduced in the United States in 1836, and later into Canada, Mexico, and Hawaii. Its membership is restricted to persons of Irish birth and descent and of Catholic faith. The order is an active supporter of the present Gaelic movement (see GAELIC LEAGUE), having endowed a Celtic chair at the Catholic University of America and contributed generously towards the support of Gaelic organizers in Ireland. In 1914 the American branch, including the ladies' auxiliary, had a membership of over 250,000. In the fiscal year 1913 there were disbursed over \$2,500,000 for charitable, educational, and patriotic purposes. The American branch is closely affiliated with the parent body in Ireland as well as with those in England, Scotland, Australia, and other parts of the world.

HIBERNICISM. A term used to denote any turn of expression that belongs to, or is generally attributed to, Irish speech, and especially the Irish bull, which involves the advancing of a self-contradictory proposition or ludicrous inconsistency that a moment's thought would show to be absurd. A famous bull was made, it is said, by Sir Richard Steele when inviting a certain lord to visit him: "If, sir, you ever come within a mile of my house, I trust you will stop." Curran also used to relate a fine specimen. He started one day to attend a levee at the castle in Dublin. There was a long line of carriages, and he was suddenly startled by the pole of the carriage behind crashing into the back of his own carriage. He hastily called to his coachman to stop, saying, "The pole of the carriage in the rear is driven into ours." "And, sure, it's all right again, thin, your honor," cried Pat, "for I've just drove me pole into the carriage in front." Richard and Maria Edgeworth wrote an amusing treatise entitled *An Essay on Irish Bulls* (1802); and Maria Edgeworth's *Castle Rackrent* (1800) is full of the most delightful examples of this peculiarly Irish form of blunder. See BULL; ROCHE, SIR BOYLE.

HIBISCUS (Lat., from Gk. *ἵβλος*, *hibloskos*, mallow). A genus of plants of the family Malvaceæ, the numerous species of which are shrubs or trees, but mostly large herbaceous annuals and perennials, natives of warm climates. The flowers of many are very beautiful. *Hibiscus syriacus*, a native of Syria and Carniola, has

long been in cultivation as an ornamental shrub and has proved hardy in Great Britain and parts of the United States, where it is often known as shrubby Althæa. Some are favorite hothouse plants. The characteristic mucilaginous and fibrous properties of the Malvaceæ are very strongly developed in this genus. *Hibiscus abelmoschus* so abounds in mucilage that it is used in the northwest of India for clarifying sugar. The unripe fruit of *Hibiscus esculentus*, an annual plant with a soft herbaceous stem 3 to 5 feet high, crenate leaves, axillary sulphur-colored flowers, and pyramidal, somewhat pod-like capsules, is in general use both in the East and West Indies and southern United States for thickening soups and otherwise as an article of food. It is called okra, gumbo, gombo, gobbo, and ochro in the West Indies and southern United States; bandikai, ram-turai, and denroos in different parts of India; and bammia in the west of Africa. The bark of *Hibiscus tiliaceus*, a tree 20 feet high with a very thick bole, abounds in



HIBISCUS SYRIACUS.

mucilage and is sometimes used by natives of the South Sea Islands when food is scarce. This tree, the bola of Bengal, and the moho, majagua, or mohaunt of the West Indies, is one of the most abundant trees of the South Sea Islands; and the wood, which is light, tough, and durable, is used for many purposes. The very porous bark is made into cordage and matting in various tropical countries. Many other species yield fibres; but the most important in this respect is *Hibiscus cannabinus*, the Ambaree hemp, and Deccan hemp of western India, called palungoo at Madras, and mesta pat in Bengal—a plant very generally cultivated in all parts of India, although nowhere to a great extent. It is an annual herb with a straight, unbranched stem, 3 to 7 feet high. The fibre is not so strong as hemp and is useful only for ropes and coarse fabrics. It has been suggested that many species of *Hibiscus* might be found valuable for the manufacture of paper. *Hibiscus sabdariffa*, Jamaica sorrel or roselle, is very generally cultivated in warm countries, on account of its calyx, which, as the fruit ripens, becomes fleshy and acquires a very pleasant acidity. It is used for making tarts and jelly, resembling the cranberry in this respect, and a decoction of it, sweetened and fermented, affords a refreshing beverage. *Hibiscus abelmoschus*, sometimes called musk mallow, common in tropical countries, is cultivated for its seeds, called ambrette, or *graines d'ambrette*, which have a fragrance in-

intermediate between musk and amber, and are much used by perfumers. In Egypt and Arabia these seeds are mixed with coffee, and stimulant and stomachic qualities are ascribed to them. The petals of *Hibiscus rosa-sinensis* are astringent and are used by the Chinese to blacken their eyebrows and their shoes. A number of species of *Hibiscus* are cultivated as ornamental plants in the United States, while others are extensively grown as ornamental hedge plants in the tropics. A large number of ornamental hybrids have been produced. There are several indigenous species in eastern and southern United States. See Plate of YAM, SWEET POTATO, ETC.

HICCOUGH, hik'kūp, or **HICCUP**. SINGULTUS. Sudden short, convulsive inspirations, attended with a peculiar sound produced in the larynx by the inrush of air. The movements concerned in the production of hiccough are a spasmodic contraction of the diaphragm and a certain degree of constriction in the glottis. The incoming column of air striking the partly closed glottis occasions the peculiar sound. These convulsive inspirations commonly succeed each other at intervals of a few seconds. The paroxysm may last only a few minutes, or may extend to hours or days, in which case it may be dangerous to life, from the exhaustion which it causes. Overdistention of the stomach by food or drink or by gas is the most frequent cause. Certain diseases are frequently attended by hiccough. It occurs occasionally after severe hemorrhage, in debilitating diseases, pneumonia, peritonitis, appendicitis, etc., in which cases it is a grave symptom. In typhoid fever it is often the sign of perforation or general peritonitis.

When the attack is slight, it may often be stopped by making a very full inspiration, and then holding the breath as long as possible, the diaphragm being thus held in a state of voluntary contraction. A drink of water gives relief in many cases. In more obstinate cases aromatic spirit of ammonia, camphor, musk, or an emetic may be resorted to. When hiccough continues for an hour or more and the exhaustion is great, a general anæsthetic may be necessary. Hypnotism has proved successful in neurotic individuals; sticking the tongue far out of the mouth and holding it there for two minutes or more has cured others. Lastly, counterirritation over the back of the neck is sometimes efficacious.

HICHBORN, PHILIP (1839-1910). An American naval officer. He was born in Charlestown, Mass., studied in the Boston High School, was a shipwright apprentice in the Boston Navy Yard, and, having gone to California in 1860, became master shipwright of the Mare Island Navy Yard in 1862. He entered the navy in 1869 with rank of lieutenant and served as assistant naval constructor until 1875, when he was commissioned full constructor. Four years afterward Hichborn was sent to Europe to report on foreign dockyards, and his book on this subject became a standard textbook. For a time he served on the board of inspection and survey, and in 1881 he was appointed to the naval advisory board. In that capacity and as chief constructor, in which position he served in 1893-97, he was prominently connected with the construction of the new navy. He was retired in 1901, with the rank of rear admiral.

He was the author of *European Dockyards*, *Standard Boats*, and *Sheathed and Unsheathed Ships*, and was the inventor of the Franklin life buoy and the Hichborn balanced turrets.

HICHENS, ROBERT SMYTHE (1864-). An English novelist, born at Speldhurst in Kent. He was educated at Clifton College, the Royal College of Music, and the London School of Journalism. He began early to write lyrics for music, and stories. His *Green Carnation* (1894), published anonymously and attributed to Oscar Wilde, created a sensation. It is a satire on the decadents. Among succeeding novels are: *An Imaginative Man* (1895); *Flames* (1897); *The Slave* (1899); *Tongues of Conscience* (1900), short stories; *The Prophet of Berkeley Square* (1901); *Felix* (1902); *Black Spaniel*, and *Other Stories* (1905); *The Garden of Allah* (1905), elaborately presented as a play in New York; *Bella Donna* (1909), in which Madame Nazimova starred in 1913; *The Dicer on the Threshold* (1911); *The Way of Ambition* (1913). He also collaborated in successful plays, as *The Medicine Man* and *Becky Sharp*. In 1914 he published *The Spell of the Holy Land*.

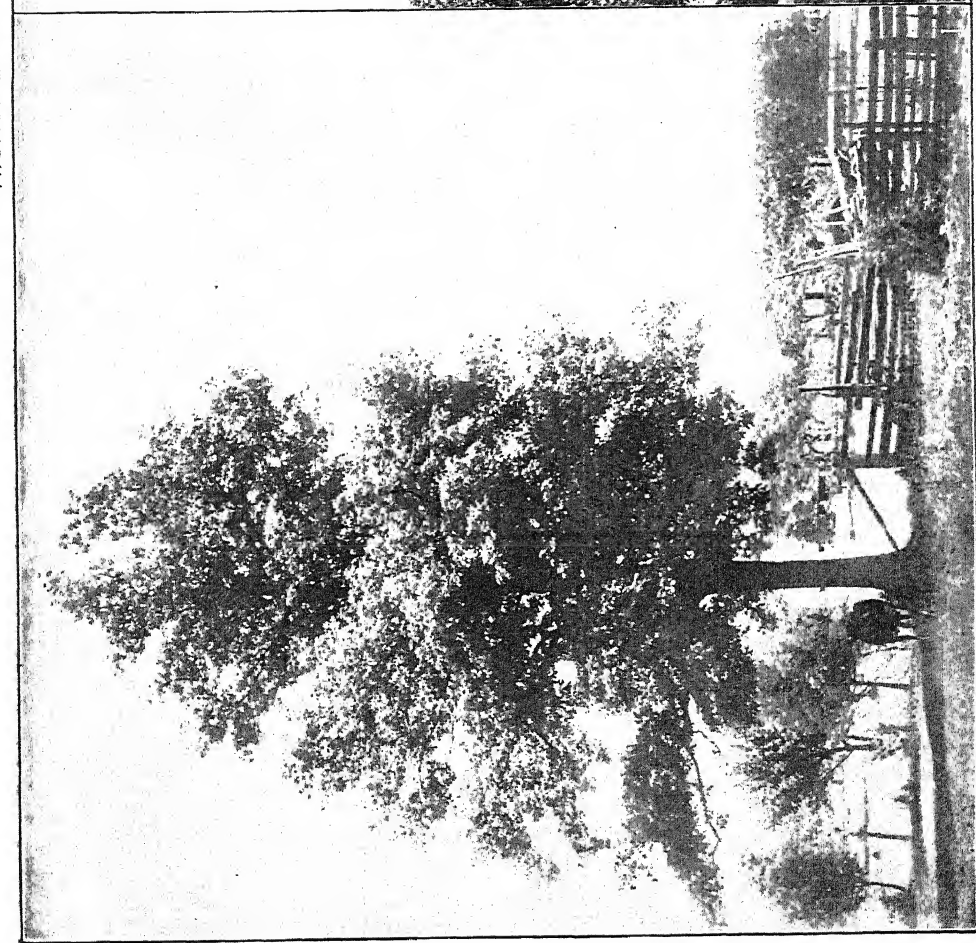
HICKES, GEORGE (1642-1715). An English nonjuring clergyman, philologist, and author. He was born at Newsham, Yorkshire, studied at Northallerton Grammar School, then proceeded as sizar to Oxford, where he graduated B.A. in 1662. In 1664 he received a fellowship of Lincoln College and the following year received his M.A. degree. He was ordained at Lincoln College in 1666, was a tutor for a time, visited France in 1673, was appointed rector of St. Elbe, Oxford, in 1675, and in 1676 became chaplain to the Duke of Lauderdale, whom he accompanied on his journey as High Commissioner to Scotland. Several rapid promotions culminated in a chaplaincy to James II and the deanship of Worcester (1683). At Worcester his study of the Germanic languages resulted in the publication of the *Anglo-Saxon and Maso-Gothic Grammar* (1689). At the time of the revolution he refused to take the oath of allegiance to William and Mary and was deprived of his benefices. In 1693 he visited the exiled King at Saint-Germain, with a mission from the nonjuring clergy for coördinate action in regard to the continuance of their episcopal rights, and in 1694 he was consecrated by their leaders as Suffragan Bishop of Thetford. His subsequent publications in controversial and practical divinity were numerous. His greatest work is *Linguarum Veterum Septentrionalium Thesaurum Grammatico-Criticum et Archæologicum* (3 vols., 1703-05). Among his other writings are *Controversial Letters* (1710), *Sermons* (1711), and a volume of *Posthumous Discourses*, published in 1726.

HICK'LEY, EMILY HENRIETTA (1845-). An English poet and prose writer, born at Macmine Castle, Wexford, Ireland. With F. J. Furnivall she founded the Browning Society (1881), and she became known as a lecturer. In 1902 she edited, and rendered from old English, the romance *Havelock the Dane*. Her other publications include: *A Sculptor and Other Poems* (1881); *Verse Tales* (1889); *Michael Villiers, Idealist, and Other Poems* (1891); *Poems* (1896); *Our Lady of May and Other Poems* (1902); *Thoughts for Creedless Women* (1905); *Lois* (1908); *Our Catholic Heritage in English Literature* (1910); *Later Poems* (1913).

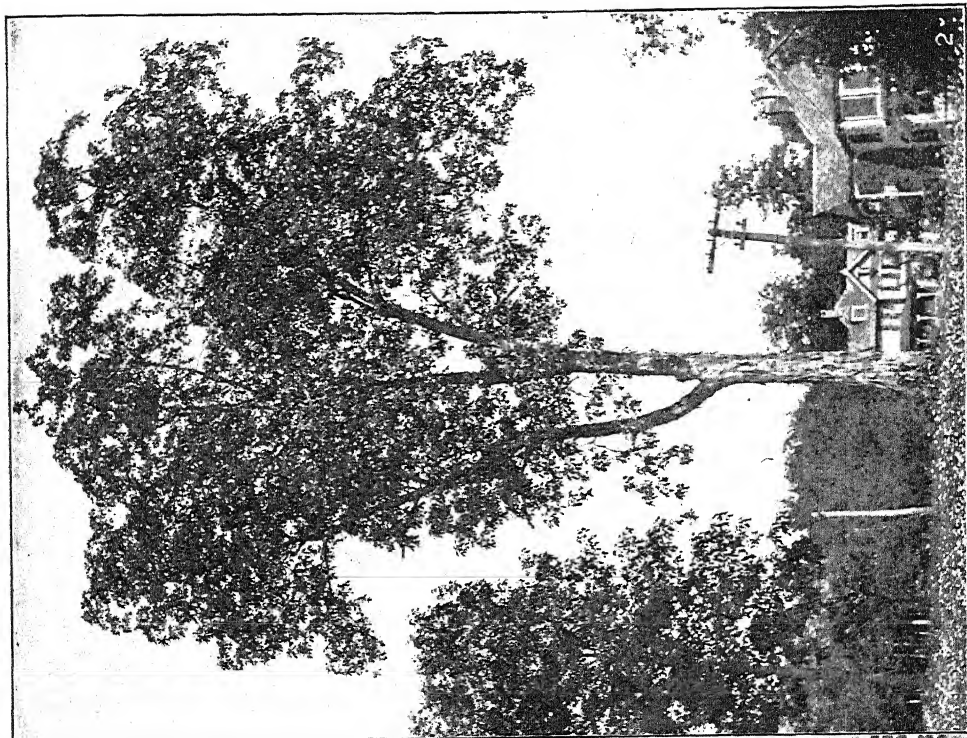
HICKEY, JAMES A. HARDEN-. See HARDEN-HICKEY.

HICK'OK, LAURENS PERSEUS (1798-1888). An American writer on philosophy. He was

HICKORIES



1. BITTERNUT HICKORY (*Carva amara*)



2. SHAGBARK HICKORY (*Carva alba*)

born in Bethel, Conn., was pastor at Newtown, Kent, and Litchfield, Conn. (1822-36), professor of theology in Western Reserve College, Ohio (1836-44), professor in Auburn Theological Seminary (1844-52), professor of mental and moral science in Union College, and vice president (1852-66) and president (1866-68). After his resignation of the last-named office Dr. Hickok resided at Amherst, Mass. Among his published works are: *Moral Science* (1853); *Mental Science* (1854); *Rational Cosmology* (1858); *Rational Psychology* (1861); *Humanity Immortal* (1872); *Creator and Creation* (1872); *Logic of Reason* (1874).

HICK'ORY. A city in Catawba Co., N. C., 67 miles by rail northwest of Charlotte, on the Southern and the Carolina and Northwestern railroads (Map: North Carolina, A 2). It is the seat of Lenoir College (Lutheran), opened in 1891, of the Claremont Female College, opened in 1880, and has a hospital.

There are furniture, chair, and cotton factories and manufactures of flour, lumber, foundry products, compressed-air pumps, hosiery, gloves, overalls, horse collars, carriages and wagons, leather, etc. Hickory adopted the commission form of government in 1913. The city owns its water works. Pop., 1900, 2535; 1910, 3716.

HICKORY (formerly *hicoory*, *po'hichery*, from the North American Indian name). *Carya*, or *Hicoria*. A genus of trees formerly included among walnuts (*Juglans*) in the family Juglandaceæ. The hickories are exclusively North American, but some are grown in European forests for their valuable timber. They are large and beautiful trees, with pinnate leaves, and attain a height of 70 or 80 feet. Their timber is very heavy, strong, elastic, and tenacious, but decays speedily when exposed to heat and moisture and is peculiarly liable to injury from worms. Great quantities of hickory are used to make hoops for casks. It is much used for handspikes, axe handles, baskets, agricultural implements, etc.; the second growth, being tougher, is preferred for these purposes. When used for baskets, the logs are cut into sections of the required length, steamed in vats, and cut in a veneering machine, after which they

arates to the base upon maturity. The nuts of some of the species are of excellent flavor. The shellbark and shagbark hickories are so called from their shaggy outer bark which peels off in long, narrow plates. The hickories are found from Maine to Florida and west to Minnesota, Kansas, and Texas, and extending into Mexico, several species occurring throughout the entire range. The trees are mostly slow-growing. In forests they grow tall with few limbs, but in the open they branch widely and have many desirable qualities desired in park trees.

The principal species, according to different authorities, are:

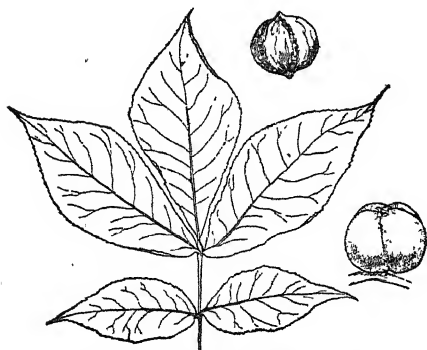
	Gray (Seventh Edition).	Britton and Brown.
Pecan	<i>Carya illinoensis</i>	<i>Hicoria</i>
Shellbark hickory	<i>ovata</i>	<i>pecan</i>
Big shagbark hickory	<i>laciniosa</i>	<i>ovata</i>
Mockernut hickory	<i>alba</i>	<i>laciniosa</i>
Pignut hickory	<i>glabra</i>	<i>alba</i>
Bitternut hickory	<i>cordiformis</i>	<i>glabra</i>
Water hickory	<i>aquatica</i>	<i>minima</i>
Nutmeg hickory	<i>myristicea-</i>	<i>aquatica</i>
	<i>formis</i>	<i>myristicea-</i>
Small pignut hickory	<i>microcarpa</i>	<i>formis</i>
		<i>microcarpa</i>

The Mexican hickory, *Carya mexicana*, and the Texan hickory, or bitter pecan, are other important species.

HICKORY-POLE CANVASS. The name given to the canvass for Andrew Jackson in the presidential election of 1828.

HICKORY SHAD. See MUD SHAD.

HICKS, ELIAS (1748-1830). An American minister of the Society of Friends, born at Hempstead, L. I. While still a young man of 20, he began to feel a deep interest in religion. He began the work of a minister in 1775, and within a few years his upright life and his ability as a speaker gained for him universal recognition. During the next half century he traveled widely through the Eastern States from Maine to Maryland, preaching and organizing new meetings. He was an earnest and influential advocate of abolition, not hesitating to speak against slavery even in such a slaveholding community as Maryland. To his efforts was due in large measure the passing of the act (in 1817) which emancipated all slaves in New York in 1827. He first became the leader of a faction in the society in 1817. For a number of years before that there had been a determined effort made by some of the members to effect a closer union with the Friends of the English society, and as a step towards this was proposed the adoption of an orthodox creed, the main points of which were the deity of Christ and the vicarious atonement. The proposition met with considerable favor in Philadelphia, and a number of Friends from that city went down to the Baltimore yearly meeting in 1817 to advocate it there. Hicks, who was present, spoke eloquently against the measure and secured its rejection. From that time may be dated the schism in the society which became complete in 1828. Hicks was charged with denying the atonement and the divinity of Christ. Those who agreed with him—called Hicksites as a term of reproach—formed a separate body, and for many years there was great bitterness of feeling between the two factions. Of late, however, this has largely disappeared. Hicks published: *Observations on Slavery* (1811); *Sermons* (1828); *Journal of the Life and Religious Labors of Elias Hicks* (1832); *Letters* (1834). Consult his life, by Wilbur (Philadelphia, 1910). See FRIENDS.



SHELLBARK HICKORY (*Carya ovata*).

are chopped into splints of the required width. Shafts of carriages, handles of whips and golf clubs, large screws, etc., are made of hickory. It is greatly esteemed for fuel. The fruit of the hickory is a smooth, hard-shelled nut covered by a four-parted husk, which in most species sep-

HICKS, JOHN BRAXTON (1823-97). An English gynecologist and anatomist, born at Rye and educated at Guy's Hospital in London and at the University of London. He was obstetric physician at Guy's Hospital from 1858 to 1883, and at St. Mary's Hospital from 1888 to 1893. He became a fellow of the Royal Society in 1862 and was president of the Obstetrical Society (1871) and of the Hunterian Society (1879). He wrote *The Honey Bee* (1860), with James Samuelson, besides many contributions to the *Guy's Hospital Reports*, to the *Transactions* of the Obstetrical Society, to the *Proceedings* of the Medical Society, and to the *Lancet*.

HICKS (EDWARD) SEYMOUR (1871-). An English actor, playwright, and manager. He was born in St. Heliers, Jersey, the son of an English captain in the Forty-second Highlanders. He was educated for the army, but could not pass his entrance examinations, and went on the stage before he was 17. He married Ellaline Terriss and played with her in England and on five tours of the United States. In 1892 he played in *Walker, London*, J. M. Barrie's first play, at Toole's Theatre, London; dramatized with Laurence Irving *Le Fanu's Uncle Silas*; and wrote a military one-act sketch, *The New Sub*, which ran 400 nights. In *Under the Clock*, a theatrical travesty, or *revue*, which he wrote with Charles Brookfield, Hicks first had a dancing and singing part of the kind he later made famous. In 1893-98 he was leading light comedian of the Gaiety Company, and his great success after that time was due to his part in developing the typical Gaiety shows—musical comedies such as *The Shop Girl* (1894), *My Girl* (1895), *The Circus Girl* (1896), *The Runaway Girl* (1898), *The Cherry Girl*, which he wrote with Caryl (1903), and *The Earl and the Girl*. His best rôle in the legitimate was Scrooge in the *Christmas Carol*. He became lessee of the Aldwych and Hicks theatres in London. Consult his brightly written autobiography *Seymour Hicks, Twenty-Four Years of an Actor's Life* (London, 1910).

HICKS, THOMAS (1823-90). An American portrait painter. He was born in Newtown, Pa., and studied at the Philadelphia Academy and afterward at the National Academy, New York. Visiting Europe from 1845 to 1849, he studied with Couture in Paris. He was elected member of the National Academy in 1851 and established studios in New York and Trenton, N. J. His color is good, his drawing is carefully executed, with elaborate accessories, and his composition is well balanced. Some of his best-known portraits are: Edwin Booth as Iago, Henry Ward Beecher, Longfellow, Dr. Kane, William M. Evarts, Bayard Taylor, Hamilton Fish, Luther Bradish (1857); Henry Abbot (1863), New York Historical Society; Parke Godwin (1879); Mrs. S. F. Billings (1883); Dr. James R. Wood (1884), New York Academy of Medicine.

HICKS, THOMAS HOLMIDAY (1798-1865). An American politician, born in Dorchester Co., Md. He became sheriff in 1824 and a member of the State Legislature a few years later, was a member of the State Electoral College and was again elected to the Legislature in 1836, and in 1837 served on the Governor's Council. From 1858 to 1862 he was Governor of the State. He strongly sympathized with the South and was indignant with the Northern people for their general attitude towards slavery and in particular for their refusal to enforce the Fugitive

Slave Law. When actual hostilities between the two sections began, he seemed to think that the State could assume a neutral attitude and largely by his refusal to call a special session of the Legislature managed to block radical measures. He saw that secession for Maryland meant devastation, and his policy gradually evolved itself until he found himself vigorously opposing secession and defying the Legislature. Rumors were current in the early part of 1861 of a plot in which 3000 citizens of the State were organized to prevent Lincoln's inauguration and seize the city of Washington. He made preparations to thwart the attempt, caused State arms to be seized, suspended the writ of habeas corpus, planned the arrest of suspected persons, and indorsed the administration in establishing a censorship of the press and in breaking up the Legislature. This body at his summons had met in special session at Frederick in April, 1861, and had declared against secession. The proximity and alertness of the Federal headquarters was in reality all that prevented a serious secessionist movement, Hicks being the only prominent official of the State who stood by the government. At the expiration of his term as Governor, a new Legislature passed resolutions thanking him in its name and in the name of the people of Maryland for his attitude during the crisis and declaring that it was he who had kept the State from joining the Confederacy. In 1862 Lincoln offered him the rank of brigadier general, but ill health prevented his acceptance. In the same year he was appointed to the Senate to supply the vacancy occasioned by the death of Senator Pearce and served in that body during the remainder of his life. Although he was at the same time denounced for selling the State to Lincoln and praised for saving it by his remarkable ability, it is largely the uniqueness of the position in which he was placed which makes him especially memorable. Consult: G. L. P. Radcliffe, "Governor Hicks of Maryland and the Civil War," in the *Johns Hopkins University Studies in Historical and Political Science* (19th series, nos. xi, xii, Baltimore, 1901).

HICKS, WILLIAM. See **HICKS PASHA**.

HICKS, WILLIAM MITCHINSON (1850-). An English physicist, born in Launceston, Cornwall. He was educated at St. John's College, Cambridge, of which he became fellow in 1876. In 1883-1905 he was principal of Firth (after 1895, University) College, Sheffield, and professor of physics. In 1912 he received the Royal Society's gold medal. Besides contributions to the *Transactions* of that society on many branches of mathematics and physics, most notably perhaps on spectroscopy, he wrote *Elementary Dynamics of Particles and Solids* (1890; 2d ed., 1897).

HICKS-BEACH, MICHAEL EDWARD, VISCOUNT ST. ALDWYN (1837-1916). An English administrator and financier, born in London. He was educated at Eton and at Christ Church, Oxford, entered Parliament in 1864 for East Gloucestershire, and from 1885 to 1906 represented West Bristol. He was Chief Secretary for Ireland in 1874-78 and 1886-87 and Secretary of State for the Colonies in 1878-80. In 1885 Lord Salisbury appointed him Chancellor of the Exchequer and leader of the House of Commons, and he held office for a year. He was President of the Board of Trade from 1888

to 1892. In 1895, after the fall of the Gladstone ministry, he again became Chancellor of the Exchequer and administered this office with marked ability until his resignation, in 1902, immediately after the retirement of Salisbury. He assailed the new tariff policy of Joseph Chamberlain and founded the Unionist Free Food League. In 1904-06 he was chairman of the Royal Commission on Ecclesiastical Discipline; after the retirement of the Balfour ministry in December, 1905, he was raised to the peerage as Viscount St. Aldwyn, and after 1908 he was a member of the Ecclesiastical Commission. Consult Justin McCarthy, *British Political Portraits* (New York, 1903).

HICKSITES. See FRIENDS; HICKS, ELIAS.

HICK'SON, SYDNEY JOHN (1859-). An English zoölogist, born in London and educated at University College School and at Downing College, Cambridge, of which he became honorary fellow. In 1882 he was appointed an assistant at Oxford, in 1888 deputy professor of zoölogy, and in 1890 lecturer in advanced morphology. In 1894 he was appointed professor of zoölogy in Victoria University, Manchester. He traveled in the Malay Archipelago in 1885-86 and wrote: *A Naturalist in North Celebes* (1889); *The Fauna of the Deep Sea* (1894); *The Story of Life in the Seas* (1898); and chapters in vol. 1 of the *Cambridge Natural History* (1906) and in Lankester's *Treatise on Zoölogy* (1909).

HICKS PASHA, pá-shá' (properly, WILLIAM HICKS) (1830-83). An English soldier. He entered the British East Indian army as an ensign in 1849 and left the service in 1880 as an honorary colonel. Three years later he was appointed to the command of the Egyptian army in the Sudan and with a force of from 10,000 to 12,000 native troops went against the Mahdi. He at first won what seemed a decisive victory near Khartum in April; but in September, when he crossed the desert of El Obeid with a force of 10,000 to suppress a rebellion, he found himself betrayed into an ambushade, and after a battle of three days, ending with the massacre of nearly all his army, he fell in a last desperate charge of his mounted staff (November 5). Consult Colborne, *With Hicks Pasha in the Sudan* (London, 1884).

HIDAGE, hid'áj (from *hide*, AS. *híd*, *hígd*, *híged*, a certain portion of land, from ONorthumbrian *higan*, AS. *hiwan*, members of a family). An extraordinary tax, usually of two shillings, paid to the Norman and early Angevin kings of England on every "hide" (q.v.) of land. It was gradually superseded by the carucage. See CARUCATE.

HIDALGO, é-dál'gó. A central state of Mexico, bounded by the State of San Luis Potosí on the north, Vera Cruz and Puebla on the east, Tlaxcala and Mexico on the south, and Querétaro on the west (Map: Mexico, K 7). Area, 8917 square miles. The northern and northeastern portions are traversed by the east range of the Sierra Madre and form a wild and rough mountain region, rising in its highest elevation to over 10,000 feet. The southern and western parts are mostly flat and traversed by fertile valleys. The climate is warm in the lower regions, and the agricultural products include cereals, sugar cane, tobacco, coffee, maguay, and cotton. The state has extensive mineral wealth, and mining is the chief industry. The chief mineral products are silver,

quicksilver, copper, iron, lead, and zinc. Coal and marble are found. Cotton and woolen goods, bricks, and pulque are the principal manufactured products. The southern part is traversed by several railway lines. Pop., 1910, 646,551; 1912 (est.), 655,187. Capital, Pachuca (q.v.).

HIDALGO. See PACHUCA.

HIDALGO DEL PARRAL, dél pár-rál'. See PARRAL.

HIDALGO Y COSTILLA, é kô-sté'lyá, MIGUEL (1753-1811). A Mexican priest and revolutionist. He was born at Corralejo, studied at Valladolid in Mexico, and was given charge of the parish of Dolores in the State of Guanajuato. Dissatisfied with the government, he conspired with the Indians to raise a general insurrection on Nov. 1, 1810. The betrayal of the plot to the government forced him to hasten his plans, and the revolt began in September in the town of Dolores. His eloquence had a powerful effect on the people, and to heighten the enthusiasm he carried aloft the banner of Our Lady of Guadalupe, patron saint of Mexico, and gave to his insurrection the character of a crusade. He took the towns of Guanajuato and Guadalajara and with an army of 80,000 men marched on Mexico, defeating on the way a small force of soldiers sent to oppose him; but the decree of excommunication launched against him, and the discord prevailing among his lieutenants, caused his forces to melt away and forced him to retreat. He succeeded, however, in reuniting his men to meet the army sent against him by the government; but his disorderly mob of 100,000 men were pitilessly crushed by the onset of 6000 Spanish veterans, Jan. 17, 1811. Hidalgo fled and set out for the United States to procure assistance, but was captured, degraded from his priestly office, and shot. Some years later he was extolled as a saint, and the newborn Republic erected a magnificent statue to him. Consult A. H. Noll and A. McMahon, *Life and Times of Miguel Hidalgo y Costilla* (Chicago, 1910).

HIDATSA, hé-dát'sá. See MINTARI.

HID'DENITE. A yellow-green to emerald-green variety of spodumene, discovered in 1879 by W. E. Hidden, in Alexander Co., N. C. The transparent crystals, when cut and polished, resemble the emerald in lustre, although the color is not so intense as in the finer varieties of the latter gem. The green color to which hiddenite owes its importance is probably due to a very small amount of chromium. Hiddenite has a specific gravity of 3.19, and gems of 2½ carats in weight have been cut from it. When first introduced, it aroused considerable interest on account of its novelty as an American gem. It is sometimes called the *lithia emerald*.

HIDE (AS. *híd*, *híged*, *hígd*, from ONorthumbrian *higan*, AS. *hiwan*, members of a family). In Anglo-Saxon law, the family estate, corresponding to the *huba* of early Germanic law. It consisted apparently of a farm, or allotment, of definite extent, though its size varied in different places and at different periods of German and English history. The normal hide at the time of the Conquest was probably 120 acres. But the term does not seem to have been employed so much to denote a unit of land measurement as a definite parcel of land in the nature of a homestead, owned in severalty by the head of a family. As such, however, it was used by the Saxon kings as a unit of taxation,

the amount assessed on each hide being known as *hide-gild*. After the Conquest the term gradually changes its meaning and comes to designate a measure of land, but its signification is not free from obscurity at any period of its history. Consult: Frederic Seebohm, *English Village Community* (London, 1890); J. H. Round, *Feudal England* (ib., 1895); William Stubbs, *Constitutional History of England* (Oxford, 1896); F. W. Maitland, *Domesday Book and Beyond* (Boston, 1897); Pollock and Maitland, *History of English Law* (2d ed., 2 vols., ib., 1899).

HIDES. See LEATHIER.

HIDEYOSHI, hē'dā-yō'shē, TOYOTOMI (1536-98). A Japanese warrior and statesman, the son of a peasant. He was born in the village of Nakamura, Aichi Ken, Province of Owari, in 1536; became groom to Nobunaga (q.v.), who made him a soldier. He speedily distinguished himself by his military talents, and in 1575 was by Nobunaga created Lord of Chikuzen and was allowed to change his family name to Hashiba. On the death of Nobunaga, in 1582, he took such vigorous action that he became in 1586 the practical ruler of the Empire under the title of Kwambaku, or regent—a high office that had been reserved exclusively for members of the Fujiwara (q.v.) family. In 1591 he nominally retired in favor of his son Hidetsugu, taking, as was customary in such circumstances, the title of Taikō, hence popularly known as Taikō-sama. In 1592 he dispatched a large army to Korea to conquer it as a preliminary step in the conquest of China; but the expedition met with disaster, the Emperor of China having sent a large army to the assistance of the Koreans, and after his death at Kyoto, in 1598, it was recalled. Displeased with the conduct and teachings of the Jesuits, he ordered their expulsion; but no steps were taken to carry out this edict until 1596, when several Franciscan priests, Jesuits, and native Christians were crucified at Nagasaki. A monument in his honor was erected at Kyoto in 1896. He had many names; Toyotomi he received from the Emperor. His posthumous name is Toyokuni. Consult: Adams, *History of Japan* (London, 1874); Dening, *Life of Hideyoshi* (Tokyo, 1889); W. E. Griffiths, *The Mikado's Empire* (11th ed., New York, 1906); Frank Brinkley, *Japan: Its History, Arts, and Literature* (8 vols., Boston, 1910).

HIJEL, hēl, EMANUEL (1834-99). A Flemish poet, born near Dendermonde. At first he was a wool spinner, then a bookseller; then he obtained a minor government appointment and later the position of professor of oratory at the Brussels Conservatory and librarian of the Industrial Museum in the same city. He is generally considered the chief Flemish lyricist of recent times. Among his longer poems are the drama *Jacobae van Beieren* (1867; new ed., 1880) and *Bloemardinne* (1877). In addition to these there are the collections *Nieuwe Liedekens* (1861), *Gedichten* (1863), *Bloemeken en Nieuwe Liedekens* (1877), and some verses for children, *Liederen voor groote en kleine kinderen*, many of which were adapted to well-known melodies, and some of which were set to music by Van Gheluwe, *Liedersolfage* (1875). Hijel's greatest works are the poems *Lucifer* and *De Schelde*, for which Benoit composed oratorio settings; *Frighelidhymus* (music by Richard Hol); and *Prometheus* (1868). An edition of

his poetry, *Volledige dichtwerken*, was published in three volumes in 1885.

HIEN, hyēn. A governmental district in China. See CHINA.

HIEN-FUNG, fūng, or **HSIEN-FĒNG**, syēn-fōng, meaning "universal plenty," the title assumed by the seventh Emperor of the late Manchu dynasty of China. Hien-Fung was the fourth son of the Emperor Tao-kuang, was born in 1831, and succeeded to the throne in 1850; but his reign, according to custom, dates only from the following year. He proved to be strongly antiforeign. At the beginning of his reign the Taiping Rebellion broke out in Canton Province; hordes of fanatics and lawless persons joined the standard of the "Prince of Peace," as the leader, Hung Hsiu-ch'ian, who claimed to be a Christian, styled himself; half the country was devastated, and 20,000,000 are said to have been put to the sword. The rebellion would have taxed a stronger man; but able statesmen and generals arose, and in 1864 this greatest of all rebellions was crushed. Meanwhile a war with Great Britain had been precipitated in 1857 by an outrage on the British flag. Canton was for a second time taken by British troops, the Taku forts at the mouth of the Peiho were captured, and a treaty was concluded in 1858 opening more new ports, throwing the country open to travelers, permitting the preaching and the practice of Christianity, and calling for more indemnity. In the following year, as the British envoy was on his way to Peking to exchange ratification as previously arranged, he was fired upon, and his party driven back. This made another expedition necessary, and in 1860 another army (France joining) and fleet took the Taku forts a second time, captured Tientsin, and proceeded to Peking. Hien-Fung fled to Jehol (q.v.), where he died in the following year, leaving his brother, Prince Kung, to negotiate a new treaty of peace, which in the circumstances was more rigorous than that of 1858. Additional ports were to be opened, Christianity was to be tolerated, along with the ratification of the entire Treaty of Tientsin of 1858, and it was agreed that henceforth a British envoy or ambassador was to be allowed to reside at Peking, which concession China had for centuries steadfastly refused to any European nation. Further, a Department of Foreign Affairs—the Tsung-li yamen (now the Waichiaogu)—was established, Prince Kung becoming its first President.

HIER/ACAS. See HIERAX.

HIERACITES, hī-ēr'a-sīts. See HIERAX.

HIERACIUM, hī-ēr'a'shī-ūm. See HAWK-WEED.

HIERAPOLIS, hī-ēr'āp'ō-līs (Lat., from Gk. Ἱεράπολις, sacred city, from ἱερός, fem. ἱερά, *hieros*, *hiera*, sacred + πόλις, *polis*, city). 1. A city in southwest Phrygia, about 6 miles north of Laodicea. It was the religious centre of the native worship of the district and was an important seat of the mysteries of the Phrygian nature goddess (who was here called Leto), her daughter, Cora, a male deity, and a son. It possessed warm springs, more or less sulphurous, which had, and still have, a remarkable power of forming calcareous incrustations. Its religious fame was also increased by the Plutonium or Charonium—a narrow but deep chasm, from which issued a noxious vapor, supposed to

be fatal to all except the eunuch priests of the goddess. This chasm had disappeared in the fourth century A.D. Extensive ruins of Hierapolis, including remains of a long avenue of tombs, a theatre, well preserved, and a large bath into which the water of the springs had been conducted, have been found. Epictetus the philosopher was born at Hierapolis. Consult: Ramsay, *Cities and Bishoprics of Phrygia*, vol. i (Oxford, 1895); Humann, *Altertumer von Hierapolis* (Berlin, 1888); Baedeker, *Konstantinopel, Balkanstaaten, Kleinasien*, etc. (2d ed., Leipzig, 1914).

2. A city in the Glaucaus valley in central Phrygia (now Kotch-Hissar), which seems to have been the old centre of a pentapolis and is known in early Christian history from the life of St. Abercius, or (better) Avirecius, of the second century A.D., who caused a remarkable protest against Montanism to be inscribed on his tomb. The original document has survived and is now in Rome. It is so drawn up that it bears a double meaning, and the esoteric Christian sense was clear only to "him who comprehends." It has also been interpreted as a heathen document. Consult Ramsay, *Cities and Bishoprics of Phrygia*, vol. ii (Oxford, 1897), and Dietrich, *Die Grabschrift des Aberkios* (Leipzig, 1896).

3. A city of Syria Cyrrhestica, known also as Bambyce (Gk. *Βαμβύκη*), situated about 25 miles south of the ancient Carchemish, on the hills southwest of the meeting of the Euphrates and Sajur rivers. It is now in ruins, but in the times of the Seleucids was a city of much commercial importance, chief station on the main road between Antioch and Seleucia-on-Tigris. It was called "Sacred City" because it was the centre of the worship of a Syrian nature goddess, Atargatis, described by Lucian (q.v.) in his *De Dea Syria*. In the reorganization of the Roman Empire under Diocletian it became the capital of the Province of Euphratensis, or Commagene, and was a very flourishing city. In the time of Justinian it had retrogressed, but the fortifications were restored by the Arabs, and it endured many vicissitudes during the Crusades. Near Bambyce silk was manufactured; from one Roman name for silk, *Bombycina vestis*, comes the word "bombazine."

HIERARCHY, hi'ér-árk-ī (from ML. *hierarchia*, Gk. *ἱεραρχία*, *hierarchy*, from *ἱεράρχης*, *hierarchēs*, *hierarchy*, from *ἱερός*, *hieros*, sacred + *ἀρχος*, *archos*, leader, from *ἀρχεῖν*, *archein*, to lead). The term was introduced by the writings of Dionysius the Areopagite, in the sixth century. The name used by theological writers to designate the whole governing and ministering body in the Church, distributed according to its several gradations. The word, in its strict acceptation, is applicable only to the Roman Catholic church and to those Christian communities which retain the prelatical form of Church government, or at least the distinctions of ecclesiastical order and gradation. The hierarchy is divided into that of *order* and of *jurisdiction*. I. Considered under the head of *order*, the hierarchy embraces all the various orders or classes of ministers to whom has been assigned the duty of directing public worship, administering the sacraments, and discharging the various other offices connected with the preaching of the gospel, through which the Church held that divine grace was given; and these are of two kinds—the orders directly instituted by divine authority and those estab-

lished by ecclesiastical ordinance. Theologians commonly distinguish a *hierarchy of divine right* and a *hierarchy of ecclesiastical right*. 1. The first includes the three ranks of bishops, priests, and deacons. The bishops are believed, as successors of the Apostles, to have inherited the integrity of the Christian priesthood. The order of episcopate, however, is not believed to be a distinct order from that of priesthood, but only a fuller and entirely unrestricted form of that order. In all that regards what Roman Catholics believe to be the Christian sacrifice of the eucharist, they hold that the priest possesses the same powers of *order* with the bishop; but he cannot confer the sacrament of orders, nor can he validly exercise the power of absolving in the sacrament of penance without the approbation of the bishop. 2. To the three ranks thus primitively instituted several others have been added by ecclesiastical ordinance. (See **ORDERS**, HOLY.) II. The *hierarchy of jurisdiction* directly regards the government of the Church and comprises all the successive degrees of ecclesiastical authority—beginning with the Pope as primate of the universal Church and extending to the patriarchs as ruling their several patriarchates, the primates in the several kingdoms as national churches, the metropolitans or archbishops within their respective provinces, and the bishops in their dioceses.

In the Anglican church, with the office of the episcopate, the theory of a hierarchical gradation of rank and of authority has been retained. The Anglican hierarchy comprises bishops, priests, and deacons. In the other reformed churches a hierarchical government is practically nonexistent.

HIERATIC WRITING. See **HIEROGLYPHICS**.

HIERAX, or **HIERACAS** (Lat., from Gk. *Ἱέραξ*). An Egyptian ascetic of the third century. He is said to have lived to the age of 90 and devoted himself to scientific and literary pursuits. He was the author of biblical commentaries, both in Greek and Coptic, and is said to have composed many hymns. He became leader of the sect of the Hieracites, an ascetic society from which persons living in the married state were excluded. On other points Hierax followed Origen in allegorizing Scripture. Because of his view of matrimony, his denial of the resurrection and of a visible paradise, and his assertion that infants, as incapable of "striving lawfully," cannot inherit the kingdom of God, Hierax was regarded as a heretic. Consult Harnack, *History of Dogma*, vol. iii (Boston, 1897).

HIERO (hi'ér-rō), or **HIERON**, I (Lat., from Gk. *Ἱέρων*). A tyrant of Syracuse, who succeeded his brother Gelo in 478 B.C., having already, a short time before, distinguished himself in the battle of Himera. Being jealous of his brother Polyzelus, who had command of the army, he dispatched him on an expedition against Crotona (q.v.); but Polyzelus fled to his brother-in-law, Theron of Agrigentum. Hiero undertook to make war on the two; but a reconciliation was effected, it is said, by the poet Simonides. Some time after this reconciliation Hiero assisted the people of Cumæ (q.v.) in driving off the Etruscan pirates, by whom they were harassed. He transferred the inhabitants of Naxos and Catana to Leontini and, repeopling Catana with citizens from Syracuse, Gela, and elsewhere, called it *Ætna*. After the death of

Theron, about 472 B.C., war broke out between Theron's son, Thrasydæus, and Hiero. The former was defeated and compelled to flee from Sicily. Hiero was now supreme in the island. He died, however, shortly after, having reigned 10 years. As a ruler, Hiero was jealous, cruel, and rapacious; fearing for his life, he surrounded himself with mercenaries and spies. He was, however, a patron of poets and philosophers, and he competed successfully at the Grecian games. Consult Eduard Lübbert, *Syrakus zur Zeit des Gelon und Hieron* (Kiel, 1876), and "Hieron, 2," in Pauly-Wissowa, *Real-Encyclopadie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HIERO II (c.308-216 B.C.). A king of Syracuse, illegitimate son of a noble Syracusan named Hierocles. He first distinguished himself in the wars with Pyrrhus, and then, after Pyrrhus's departure from Sicily (275 B.C.), by his successes in the war with the Mamertines (q.v.). In consequence of his military triumphs he was, in 270 B.C., chosen King of Syracuse. In 264 he assisted the Carthaginians in the siege of Messana against the Mamertines; but when the Mamertines secured the aid of Rome, he was himself defeated by the Roman consul, Appius Claudius, and in 263 concluded a treaty with the Romans, to whom he thereafter remained faithful. The treaty secured to him the control of southeastern Sicily and of the eastern coast as far as Tauromenium (Taormina). In both Punic wars he assisted the Romans with money and troops. During the interval of peace between the two wars he visited Rome and was received with great honors, while he himself on this occasion distributed a vast quantity of grain to the people. Hiero was a wise and merciful sovereign, simple in his ways and just in his rule. We are told that he was prevented from laying aside the kingly power only by the unanimous votes of his subjects. He bestowed great care upon the financial department of his government, and his agricultural laws (*leges Hieronicae*) were in force in Cicero's time. He was also a patron of the arts and beautified his city with many fine public buildings. His kinsman Archimedes (q.v.) he employed in the construction of a number of powerful engines of war. Consult "Hiero, 13," in Pauly-Wissowa (cited above).


HIEROCLES, hī-ēr'ō-klēz (Lat., from Gk. Ἱεροκλῆς, *Hieroklēs*). 1. A Greek writer of the sixth century A.D., who composed, under the title *Traveling Companion* (Συνέκδημος), a work containing a description of the 64 provinces of the Byzantine Empire and of 912 cities in it. It is best edited by Burckhardt (Leipzig, 1893). 2. An Alexandrian Neoplatonist of the fifth century A.D. He wrote a Commentary on the Golden Verses of Pythagoras (q.v.), and a treatise *On Providence and Fate*. The former work was popular in the Middle Ages and in the Renaissance and was translated into many languages. The latter work is extant only in a few extracts, preserved by Photius (q.v.), and in an anonymous abridgment. The Commentary is printed by Mullach, *Fragmenta Philosophorum Græcorum*, vol. i (Paris, 1875). Under the name "Hierocles" we also possess a very old collection of jokes and amusing stories (*Ἀσπεῖα*), edited by Eberhard (Berlin, 1869). This belongs, however, to a later time. 3. A Stoic philosopher, contemporary with Epictetus (q.v.), of whose Ἠθικὴ Στοιχείωσις, *Elements of*


Ethics, fragments have been preserved by Stobæus (q.v.). Consult Prächter, *Hierokles der Stoiker* (1901), and Von Arnim, *Berliner Klassikertexte*, iv (Berlin, 1906).


HIEROCLES OF BITHYNIA. A Roman proconsul in the reign of Diocletian (284-305 A.D.), governor in Bithynia and in Egypt, said to have been the instigator of the fierce persecution of the Christians under Galerius Cæsar in 303. He was a man of considerable intellectual culture and wrote a work called *Φιλαλήθεις* (Lovers of Truth), in two books, in which he endeavored to persuade Christians that their sacred books were full of contradictions, and that in moral influence and miraculous power Christ was inferior to Apollonius of Tyana. This treatise has not come down to our times and is known to us only through Lactantius and still more through Eusebius, who wrote a refutation. See APOLLONIUS OF TYANA.


HIEROGLYPHICS, or **HIEROGLYPHS** (Lat. *hieroglyphicus*, from Gk. ἱερογλυφικός, *hieroglyphikos*, hieroglyphic, from ἱερογλύφος, *hieroglyphos*, carver of hieroglyphics, from ἱερός, *hieros*, sacred + γλύφειν, *glyphein*, to carve). The term applied to those systems of writing in which figures of objects take the place of purely conventional signs, and especially used to designate the writing of the Egyptians and Mexicans. The system of Babylonia (whence the cuneiform writing developed) and that of China were likewise originally picture writings, but were very early simplified and conventionalized and thus lost their hieroglyphic character. These two systems present so many striking analogies to the Egyptian that a connection is often assumed; but these analogies appear merely to afford an illustration of the tendency of the human mind to run, under certain conditions, in the same channel; and this view is strengthened by some analogies from American pictographs and hieroglyphics. Hieroglyphic systems are also represented by the monuments of the Hittites and the early Cretans, both as yet undeciphered; an Egyptian origin would in these cases be less improbable than in the cases of Babylonian and Chinese characters. The Phœnician alphabet cannot be proved to descend from a hieroglyphic system; the names of the letters (ox, house, etc.) seem to have been merely mnemotechnic helps for learners. Evidence exists for the belief that at the time of the middle Minoan period in Crete (practically contemporary with the twelfth dynasty in Egypt) a well-organized hieroglyphic writing was in use in Crete. This came to a close in the third middle Minoan period; most interesting is the terra-cotta disk discovered in 1908 by the Italians at Phaistos. The writing, according to Evans, is non-Cretan, but probably from Anatolia. The Egyptian system is the most remarkable of all, because it always retained the most primitive form, although developing to a high degree of philological perfection. It is impossible to trace this system back to its origin in descriptive pictures; such pictures, e.g., as the North American Indians sometimes used for communications, though without developing a real writing. The very earliest monuments of Egypt, anterior to Menes, the first historical King, exhibit the system already perfected, differing in many details from the later orthography; but what were then the principles are the same as at all later periods. The invention must therefore belong to a very remote age.




The most primitive part is represented by the so-called ideographs, or word signs. Some of these are shown in the accompanying illustrations. It is very easy to represent a man





(*romet*), a woman  (*himet*). Both taken



together mean 'mankind'; one repeated three times, 'men' or 'women.' A soldier  is easily


characterized by his arms and costume; a chief  by his staff; a king by the addition of the




crown; a child  (*khrod*) by sucking its



finger. Animals can be figured to a large extent, also some plants, the parts of the human body, etc. But wood (*khel*) can be represented only by a twig ; grain (*yot*) by three grains ; water (*mov*) by wavy lines . From indications of this nature there is but a

step to symbolism. 'Hearing' (*sotem*) is expressed by the ear of an ox , while the human ear  means only 'ear'; 'weeping' (*remy*) by a weeping eye ; 'drinking' by a man drinking  (the arm and bowl alone suffice).

'Fighting battle' is symbolized by weapons ; 'going' by a pair of legs ; 'returning' by an

inversion  of this sign; 'bringing' (*eny*) by a vessel, in combination with the sign for 'going'

; 'giving' (*day*) by an arm presenting a cake . 'Rain' can, of course, be easily represented by a sky with water falling from it ; but the ideas 'night,' 'darkness,' must


be symbolized  by a star hanging from the sky; 'cool' (*qohh*) is indicated by a water sprinkler .


A great many words and ideas, however, cannot be represented at all; and here the writer surmounts the difficulty by using the signs for homophonous words or for words of somewhat similar sound, exactly as such signs are employed in our modern rebus. For example, *khun*, *khen*, 'inside, in,' and *kheny*, 'to approach,' have no etymological connection whatever with

the pictorial sign for 'hide,' 'skin' (*khen*) ,


but the same picture is used for all three words. Thus, many signs pass from the ideographic into the phonetic class; i.e., they merely represent sounds without regard to the meaning, and from word signs they develop into syllabic signs of two consonants (e.g., the figure of the hide becomes the syllabic sign *khm*, representing any syllable with the two consonants *kh* and *n*); a few signs finally obtain the value of single consonants and form the alphabet.

The rebus system, however, would have led to many obscurities. Some inscriptions, indeed, simply use the sign for *khm* for all three words and leave it to the reader to decide from the context whether 'skin,' 'in,' or 'approach' is meant. The majority of scribes, however, use as helps the so-called determinatives. For ex-


ample, they place after the sign *khm* the hieroglyph for 'house'  to indicate that it means 'within,' and distinguish the word 'approach' by the addition of a pair of legs, indicating a


verb of motion. Again,  (writing imple-



ments) means 'writing,' 'write,' 'scribe'; but, by applying the proper determinatives, the writer can readily indicate which of these meanings he wishes to convey. By placing after this sign the figure of a man he makes it clear that 'scribe' is intended, while the addition of a roll of papyrus



 indicates that 'writing,' 'book' is meant.


These determinatives are not arbitrary, but are used in accordance with certain fixed principles. Thus, all words for quadrupeds which cannot be easily represented are written phonetically and


determined by , a piece of skin; all names of



persons are determined by the figure of a man or woman; all names of trees by a tree ;

small plants by ; drugs, sand, etc., by round grains ; actions of the mouth (eating, speak-

ing, etc.), or thought by ; violent actions by a man  or an arm in the act of strik-

ing ; localities by a house, etc. To these determinatives belongs also the so-called cartouche (q.v.), or frame surrounding royal names. Perfectly analogous determinatives are found in Babylonian (where, however, they are rather sparingly employed) and in Chinese.

A great many of the ideographs are polyphonous, i.e., they admit of more than one pronunciation; as, e.g., the picture of a horse might be understood by an Englishman as standing for 'horse,' 'steed,' 'mare.' To prevent such ambiguity, many signs receive what is called the phonetic complement. For example, the sign  *mn* (originally representing a draught-board) is very rarely used alone; an *n* is generally placed after it to fix the pronunciation. There-

fore *men*, 'to remain,' is usually written  ,


i.e., the syllabic sign *mn* + the phonetic complement *n* (not to be pronounced separately) + the determinative 'book,' indicating that the word belongs to the category of abstract ideas. In classical orthography many signs are invariably followed by a phonetic complement. With some signs the phonetic complement precedes, while others have two or even three complements. For example, the word *seshem*, 'to lead,' is always


written    *s* (phonetic comple-


ment); the word sign *sshm* + *m* (second phonetic complement) + the determinative of a verb of motion. Thus arises a very complicated but quite regular orthography, which is of special service to the reader in that it enables him to distinguish between the different values of the polyphonous hieroglyphs. The sign 'star,' e.g., may be read *sb* or *dw*; if the latter reading be intended, a *w* follows as phonetic complement, while for the former reading an *s* is prefixed.


Word signs having several synonymous values do not always have phonetic complements. The reader, e.g., may be left to discover from the context whether the sign 'horse' is to be read *sesem*, 'horse,' *sesmet*, 'mare,' *nofer*, 'colt,' etc. The sign ☉ (the sun) may be understood as 'day' (*hrow*) or as 'sun' (*rē*).


The alphabet developed from signs for very short words containing only one firm consonant. The opinion of the first decipherers, that the alphabet was acrophonic—i.e., that the phonetic value of each letter was taken from the initial sound of the word represented by its sign—has not been confirmed. The alphabetic signs ought, of course, to be the latest element of the system; but we find them fully established on the earliest monuments, so that they certainly go back to the fifth millennium B.C. The Egyptian alphabet is as follows:*



(1)  the Semitic Aleph (ʾ), i.e., the general indication of a vowel beginning a syllable; later treated as a vowel.

(2)  (a reed leaf) *y*, as a consonant; at a very early period confounded with the preceding letter, and later distinguished from it by doubling. Thus, in the later orthography a single reed leaf stood for Aleph, a double reed leaf for the consonant *y*.



(3)  (an arm, *ē*), the Semitic guttural Ain.



(4)  *w*, or, secondarily, *u*; later variant ☉ from about 1500 B.C.


(5)  *b*.


(6)  or, more elaborately,  *p* (representing a mat?).


(7)  *f* (representing a viper or snail).


(8)  *m* (an owl); later variant .


(9)  *n* (water); later variant .


(10)  *r* (*ro*, 'a mouth').


(11)  *h* (*hay*, 'a hall').


(12)  *h* (a rough *h*; the lighter sound of Hebrew Kheth, Heth).

(13)  *kh* (the Scottish and German guttural *ch*).


(14)  *h* (similar in sound to the preceding, but somewhat softer). The sign originally stood for *hēl*, 'a belly,' and represented an animal cut open; the form here given is partially conventionalized.


(15)  *s* (originally different from the following, but soon after 3000 B.C. confounded with it). The sign represented a door bolt.


(16)  *s* (sharp *s*; early confused with the preceding).


(17)  *sh*; a conventional representation of a lake (*Shēi*).


* The arrangement is, of course, modern; explanations are added only where they are quite certain.


(18)  *q*. Hebrew Koph, Qoph, a guttural *k*. The sign represents a hill (*qay*).


(19)  *k*. It represents a working basket (*kay*?).

(20)  *g*.

(21)  *t*. Perhaps another kind of basket, or a vase.

(22)  *t*, a sibilant dental which is usually assumed to have been *th* or *z*, but seems to have been quite a peculiar sound. It was later commonly pronounced *t*.

(23)  *d*. Probably represents a hand.

(24)  *z*, or, more correctly, the Hebrew emphatic *s* (Sade).

In later times the variants increased considerably, as the scribes were continually inventing new and playful forms of the letters; in Roman times hundreds of signs were in use for the alphabet, but several of the original sounds were lost or confused in later pronunciation. However, down to 1000 B.C. the variants enumerated above were the only ones, and all these sprang up after 1800 B.C. It will be observed that originally the letters expressed only the consonants, and the vowels were, with the exception of a few vague indications, left for the reader to fill in, exactly as in unpointed Hebrew or Arabic. The group *hbs*, e.g., may be read *hobs*, *hbos*, *hebbs*, etc. Later orthography attempted to express the vowels in certain cases, especially in foreign names which demanded a more exact notation, but neither consistently nor successfully. All this adds greatly to the difficulties of the Egyptologists. They have not only to supply the vowels from Greek and other traditions, from the corresponding Coptic words, from variants, etc., but they must also reckon with the tendency of the Egyptian scribes to abbreviate and to omit consonants, where they were supposed to be readily supplied by the reader. For example, *henqet* (beer) is always spelled *hqt*. See, however, below on the present degree of certainty of reading. Foreign names and words were, in the time of dynasties 18–22, written in a strange orthography called the syllabic system. The vowels were copiously expressed by placing syllabic signs for every consonant, even where no vowel followed. For example, the Palestinian name of a city, *Shalem*, was spelled: *Sha-ra-ma*, the word *markab* (chariot), *ma-(i)ra-ka-bu-ti*, etc. This wild heaping of vowels is of little advantage to the reader and has led to many errors.

The hieroglyphics were commonly written from the right to left; more rarely from left to right. On early monuments they are frequently written from above downward, like the earliest Babylonian and Chinese writing; the arrangement called *boustrophedon* (q.v.) by the Greeks is never met with. The number of signs is in a certain sense unlimited, as the artist could vary the details of each hieroglyphic according to his individual taste. But the sculptors did not greatly abuse this liberty and usually kept within the bounds of intelligibility. As a matter of fact, the signs commonly used are only from 500 to 600 in number. The artists found full play for their fancy in the minor details of execution; in the case of some magnificent buildings they have actually designed and painted every feather of a bird, every finger of a human figure, etc., in inscriptions containing

many thousand signs. The decorative effect of the brightly painted signs is exquisite. In other cases, however, when the sculpture had to be inexpensive, the signs were reduced to the simplest possible forms; in cheap funerary inscriptions they are often mere indications of figures, and their recognition calls for all the skill and ingenuity of the trained reader.

While in monumental use the pictorial character of the hieroglyphs always remained distinct, in the writing of books this was not the case. Here a simpler, more rapid method of writing was required, and even on the monuments of the first dynasty we find the hieroglyphs simplified to a few strokes, where the pen is used instead of the chisel. On papyrus the writing soon assumed a cursive character, bearing no closer resemblance to the original pictorial hieroglyphs than our cursive script bears to our printed letters. The cursive style thus developed was called by the Greeks "hieratic," or the style for sacred writings, in contradistinction to the demotic character (see below), which was exclusively employed for profane matters. This cursive style is found on the earliest books which have been preserved (dating from the fifth dynasty). To give an idea of hieratic, we reproduce here the first seven letters of the alphabet (without variants)



in the cursive style of about 1400 B.C. One can still recognize the original form of the arm, the *b* (leg), and the *f*; but the two birds have become mere flourishes in which only the boldest fancy can detect a resemblance to the original pictures. Of course, this style of writing changed more than the monumental forms, and every century had its marked peculiarities. The Greek name must not be misunderstood; all literature, secular and religious, history, novels, love songs, business documents, letters, used the more convenient rapid style. Only funerary texts are frequently written in a simplified hieroglyphic character. It was only after the demotic had become prevalent that hieratic was reserved for books of a religious character (after 600 B.C.). Hieratic runs from right to left, like most Oriental writings; in the earliest times, however, it was sometimes written perpendicularly.

Demotic, or popular, writing, while occurring more or less in all periods of the hieratic style, is really a later development of it. The Egyptians themselves called it "the documental or epistolary style," as it seems to have been developed in the law courts and offices where the necessity of tachygraphy led to constant abbreviations, until finally a real stenography resulted. Its origin goes back to the seventh century B.C. In 400 B.C. it had assumed a convenient form, and came into general use, so that the Greeks found it employed for everything except religious literature (see above), and called it therefore the demotic (the common, popular) style or the enchorial (the writing of the country). In Roman times even religious texts were frequently written in demotic. As specimens, we give here the same seven letters of the alphabet which were reproduced above in hieratic. The second of these characters is more commonly represented by a

single vertical stroke. It will be observed that two forms* of the letter *p* are given, of which the first is more elaborately formed. The sign representing a crouching lion was reduced to a slanting stroke, etc. Whole groups of five or six hieratic signs were combined in a single



flourish. Thus the writing became rapid enough to equal in speed our modern writing and the stenographic systems of the Romans; but its study was complicated, and it became unintelligible where not written very distinctly. The number of demotic signs was smaller than that of hieratic (not over 200). Like hieratic, demotic was written from right to left. It is a common error to suppose that demotic means "popular language"; the term properly designates a style of Egyptian writing, and a phase of the language, although documents written in the demotic script are usually composed in a later form of Egyptian. The Egyptian language, of course, underwent great modifications in course of time; the language of the earliest texts known to us—the religious texts in the pyramids—seems to have offered great difficulties to the Egyptian scholars of about 2500 B.C.

The use of the contemporary vernacular language was rarely allowed in literature, and in general the hierogrammates (sacred scribes) sought to write in as archaistic a style as possible. After 1600 B.C. they found it more and more difficult to write the old language correctly, and from about 1400 to 1100 B.C. the living vernacular language was used for letters, legal documents, and entertaining literature. The language of this period, the so-called Neo-Egyptian, has been treated by Eрман, in his *Neuägyptische Grammatik* (Leipzig, 1880). After 1000 B.C. the scribes reverted to an exaggerated archaistic style, and the texts became more and more ungrammatical; the barbarous age began after 500 B.C., and in Roman times the monumental texts are so wild in grammar and orthography that their decipherment is especially difficult. In demotic literature a mixture of ancient and modern language prevailed. The vernacular language finally came into literary use in Roman times through the influence of Christianity. The heathen and their priests continued to write hieroglyphics on the monuments, hieratic and demotic on papyrus, almost to the end of heathenism. The last datable hieroglyphic inscription is found in the temple of Esne (q.v.) and contains the name of the Emperor Decius (250 A.D.). A demotic inscription at Philæ (where paganism lingered on after the edict of Theodosius, 379 A.D.) is dated in the year 453 A.D. Even later, some sporadic knowledge of the old writing may have existed; but, stamped with the reproach of heathenism, it soon sank into oblivion.

Some attempts to write the living language in the Greek alphabet, supplemented by some demotic signs, had been made in pagan times, and we possess a papyrus, containing a horoscope, which seems to have been written about 100 A.D. It was, however, the desire to make the sacred Christian writings accessible even to the unlearned that led to the origin of Coptic writing and literature. The date of the Coptic version of the Bible is disputed; but it does not

seem to be older than the third century, perhaps later. Coptic was written with 24 Greek and 7 demotic letters. On its history and its extinction as a living language at the end of the Middle Ages, see COPTIS.

Interest in the lost knowledge of hieroglyphics was awakened in Europe in the sixteenth century. About 1650 the learned Jesuit Athanasius Kircher endeavored to interpret them by a fanciful method of his own, finding long theological and philosophic systems in groups which contained only the names of kings, etc. The few monuments with hieroglyphics which were then known were explained by means of Hebrew, Chaldee, Chinese, etc., rarely by means of Coptic, which was known only imperfectly in Europe before the eighteenth century. The Greek traditions on hieroglyphics in Horapollo, Tsetses, etc., were not incorrect, as has now been recognized, but insufficient. The basis for decipherment was furnished by the French expedition to Egypt under Napoleon. Through it a much larger number of the Egyptian monuments became known, above all the famous inscription of Rosetta, which proved the key to the decipherment. This stone, found by a French artillery officer in building a fort near Rosetta in 1799 and brought to London after the capitulation of the French army (see ROSETTA STONE), contains a decree of the Egyptian priests in honor of Ptolemy V Epiphanes and his Queen Cleopatra, written in Greek and preceded by a translation into hieroglyphics and demotic. Unfortunately the hieroglyphic text was much mutilated and for some time defied the efforts of the decipherers. The demotic part was better preserved, and De Sacy, Akerblad (1802), especially Thomas Young (1773-1829), correctly established the sense of many groups and sentences. Dr. Young came very near finding the correct value of some hieroglyphic letters (1819); but the merit of the decipherment belongs entirely to J. F. Champollion (q.v.), even if he did not work quite independently of Young, as he always claimed. He took as starting point the two names "Ptolemy" and "Cleopatra," furnished by the Rosetta Stone and an obelisk at Philæ. These two names yielded 13 signs, the phonetic value of which Champollion determined correctly or approximately. He next identified the name "Alexander," which furnished three more signs, and thus went on step by step, through the names of the Ptolemaic kings and Roman emperors found on the monuments, and if he had not died prematurely (1832) he would doubtless have succeeded in reading more than single sentences and in perfecting his system, which even in his posthumous works does not do full justice to his genius. His discoveries were continued by Rosellini, Salvolini, later by Birch, Lepsius, De Rougé, and Chabas. For a long time the errors of Seyffarth and Uhlemann exercised a confusing and hindering influence. The French and Tuscan expeditions under Champollion and Rosellini, and especially the Prussian expedition under Lepsius (q.v.), furnished rich material from the monuments. Grammars of the language of the hieroglyphics were published by De Rougé, *Chrestomathie égyptienne* (Paris, 1867-75); Birch, in Bunsen, *Egypt's Place in the World's History* (London, 1887); Brugsch, *Hieroglyphische Grammatik* (Leipzig, 1872), also in French (1867); later grammars by Lepage Renouf, *Elementary Grammar of the Egyptian Language* (London, 1875); Budge,

First Steps in Egyptian (ib., 1895); Loret, *Manuel de la langue égyptienne* (Paris, 1889). Erman's book, *Ägyptische Grammatik* (2d ed., 1902), is very brief, but best represents the present knowledge. On his grammar of Neo-Egyptian, see above; his *Sprache des Papyrus Westcar* (Göttingen, 1889) treats of an early vernacular phase of the language. A copious dictionary is in preparation under the auspices of the Berlin Academy, as Brugsch's *Hieroglyphisch-demotisches Wörterbuch* (7 vols., Leipzig, 1867-80), although the best Egyptian dictionary at present in existence, is rapidly becoming antiquated. The dictionaries of Birch (in Bunsen V.), Pierret, *Vocabulaire hiéroglyphique* (Paris, 1875), and Levi, *Vocabolario geroglifico Copto Ebraico* (Turin, 1887), are less reliable than that of Brugsch. Several journals are devoted to Egyptology, viz., *Zeitschrift für ägyptische Sprache und Altertumskunde* (Berlin), *Receuil de Travaux Relatifs à la Philologie et à l'Archéologie Égyptiennes et Assyriennes* (Paris), *Sphinx* (Upsala); and the literature of the subject is growing immensely. The success which attended the study of hieroglyphics attracted the attention of students to this branch of Egyptology, and demotic was for a long time neglected. In 1855 Brugsch published his *Grammaire démotique*, which, though now antiquated, formed the basis for all subsequent investigations. Again neglected for a considerable time, the study of demotic was revived by Revillout, who devoted special attention to the legal documents written in demotic script (*Chrestomathie démotique*, Paris, 1880); but his works are to be used with great caution. In more recent times the most meritorious publications on the subject of demotic are those of F. Ll. Griffith and W. Spiegelberg. The hieratic documents were first made intelligible by the works of Chabas and Goodwin. The paleography of hieroglyphics has recently been treated by Griffith in several volumes of the *Archæological Survey of Egypt*. (See EGYPTOLOGY.) It may be remarked that the question as to whether the decipherment of Egyptologists rests on a better basis than the vagaries of Kircher was frequently asked as long as the fragmentary Rosetta Stone was the only bilingual (or rather trilingual) text. After the discovery of the larger and perfectly intact trilingual text, called the Decree of Canopus, containing a decree of the priests in honor of Ptolemy III Euergetes, in the year 238 B.C. (found by L. Reinisch, 1886, near Tanis; his companion Lepsius also claimed the discovery), such doubts became impossible. Since that time various bilinguals have been found, and other sources which control the decipherment are now available. The exact pronunciation of the vowels, which were never perfectly expressed in Egyptian writing and changed frequently in course of time, is much disputed and will possibly never be settled with absolute certainty in all points. The texts, however, are now, generally speaking, at least as well understood as any Phœnician inscription or as the Hebrew text of the Bible. The time when they will be understood as well as Greek or Latin writers may not be far distant. That the Phœnician alphabet, the mother of our modern writing, was derived from the Egyptian hieratic signs was claimed by De Rougé (*Mémoire sur l'origine égyptienne de l'alphabet phénicien*, Paris, 1874), and this hypothesis has become very

popular; it is, however, highly improbable and is losing ground among scholars.

Much less perfect was the hieroglyphic writing of the Aztecs or Mexicans, which was used also in Central America, especially by the Mayas. Unfortunately the literature written in those hieroglyphs was destroyed so thoroughly by the Spanish priests that only a very few manuscripts (preserved in Rome, Dresden, etc.) have survived, besides a few inscriptions on stone. The Spanish writers of the sixteenth century have left the explanation of a few signs only, so that the Aztec writing is almost entirely unintelligible. However, what we understand of it seems to show that the Mexicans did not advance much beyond the pictographic stage, though the pictures they used were highly conventionalized. They could express the names of persons, places, months, etc., by painting the objects or beings after which they were called, and went so far as to use symbolical signs of plants and animals to express grammatical forms, so that their pictures were not read but interpreted. Where, e.g., they recorded historical events, they had to picture these, as the inscriptions alone would have been insufficient. The majority of their books seem to have been calendars, lists of omens, etc., for which their imperfect writing system sufficed. It is said that some Spanish monks made use of hieroglyphic signs for expressing Latin prayers. For example, they are said to have expressed the words *pater noster* by a flag (*panthi* = *pa*), a stone (*teti* = *te*), a cactus-fruit (*nochtli* = *noch*), and a stone (= *te*, see above). Rude as this system seems, it marked, nevertheless, a step in advance, as the hieroglyphs from word signs became phonetic signs. Such attempts, however, remained perfectly isolated; the Spanish missionaries usually showed the greatest hostility to anything recalling the former Aztec idolatry. The term "hieroglyphic" was used by the writers of emblemata, or devices, symbolizing gnomic sentences taken from the Greek and Latin poets and having no relation to Egyptian hieroglyphics. In recent times, also, the astrological almanacs have had their symbolical representations and supposed prognostics of future events, which they called hieroglyphs.

Bibliography. H. K. Brugsch, *Grammaire démotique* (Paris, 1855); Lepsius and Stern, *Liste der hieroglyphischen Typen aus der Schriftgeesserei des Herrn F. Theinhardt* (Berlin, 1875); Eugène Revillout, *Chrestomathie démotique* (Paris, 1880); Simeone Levi, *Raccolta dei segni ieratici egizi* (Turin, 1880); Oscar Von Lemm, *Aegyptische Lesestücke* (Leipzig, 1883); J. J. Hess, *Der demotische Roman von Stne Ha-m-n-s* (ib., 1888); Adolf Erman, *Die Märchen des Papyrus Westcar*, part ii (Berlin, 1890); H. K. Brugsch, *Aegyptologie* (Leipzig, 1891); Philippe Berger, *Histoire de l'écriture dans l'antiquité* (Paris, 1891); Adolf Erman, *Life in Ancient Egypt* (London, 1894); id., *Aegyptische Grammatik* (2d ed., Berlin, 1902).

HIERON, hî-ér-ôn. The name of two rulers of Syracuse. See **HIERO** I and II.

HIERONYMITES, hî-ér-ôn'i-mîts. The common name of four associations of hermits in Spain and Italy, who all regarded St. Jerome as their patron and example and hence derived their name. 1. The Spanish congregation founded in the reign of Alfonso XI of Castile (1312-50)

by some disciples of Tommasuccio of Siena, a hermit who had considerable following in northern Italy and observed the Franciscan rule. Their two earliest settlements were in the mountains near Toledo. Their numbers soon grew and included many persons of rank and station, such as Ferdinand Pecha, principal chamberlain to Pedro IV, and his brother Alfonso, Bishop of Jaén. The former obtained confirmation for their association from Gregory XI in 1373, under the rule of St. Augustine, and is regarded as the real founder of the order. By 1415 they had 25 cloisters, among them that of San Gerónimo de Yuste, in which the Emperor Charles V passed his last years. That of Belem, near Lisbon, became the burial place of the Portuguese royal family. A female branch of the order was founded by Maria García (died 1426). 2. The congregation of the Observance or of Lombardy, founded by the Spaniard, Lope de Olmedo (1370-1433), who became general of the foregoing order in 1422. His purpose in establishing a separate congregation was the attainment of still greater strictness. The rule which he drew up was confirmed in 1429, but after his death was exchanged for that of St. Augustine. The seven Spanish cloisters of the order were in 1595 united by Philip II with the foregoing, but the 17 Italian retained their separate existence under a general residing at Hospitaletto, near Lodi. 3. The congregation of Peter of Pisa (Pietro Gambacorta, 1355-1435), who turned from a worldly to a hermit's life in 1377 and built a church and hermitage on Montebello, near Urbino. Several small communities of Franciscan tertiaries associated themselves with him; the principal settlements were at Vicenza and Mantua. Only simple vows were taken until 1568; but Pius V imposed the solemn vows and the Augustinian rule. The order had at one time over 50 houses, including one founded at Walchensee in Bavaria in 1688 and removed to Munich in 1725. 4. The congregation of Fiesole, founded by Carlo di Montegranello and confirmed by Innocent VII in 1406 and given a constitution by Eugene IV in 1441. It came to possess more than 40 houses, including the convent of Saints Vincent and Anastasius in Rome, but was suppressed as a separate organization by Pope Clement IX in 1688. See **BROTHERS OF COMMON LIFE**.

HIERONYMUS CARDANUS. See **CARDAN**.

HIERONYMUS OF CARDIA. A Greek general in the service of Alexander the Great and also a historian. After Alexander's death he served Eumenes (q.v.), his fellow townsman. Having been wounded and captured by Antigonus, he served under the latter and later under Antigonus Gonatas, at whose court he died at the age of 104. He wrote a history of the Diadochi, as the successors of Alexander were called, and their successors, extending to 272 B.C., to the death of Pyrrhus (q.v.). Plutarch used this work in his life of Pyrrhus; it was a chief source of Diodorus Siculus (q.v.). The work was written in a plain and simple style, but was marked by careful use of official papers. He paid attention also to the history of the Romans. Consult Christ-Schmid, *Geschichte der griechischen Literatur*, vol. ii (5th ed., Munich, 1913).

HIEROPHANT, hî-ér'ô-fānt (Lat. *hierophanta*, *hierophantes*, from Gk. *ιερόφάνης*, *hieroph-*

phnúlēs, hierophant, from *iepós*, *hieros*, sacred + *pháivw*, *phainein*, to show). The head of the secret worship of Demeter, at Eleusis, who at the celebration of the mysteries (q.v.) showed and explained the sacred objects and explained also the ceremonies. He was required to be one of the old priestly family of Eleusis, the Eumolpidæ (see EUMOLPUS), and probably was prohibited from holding any other office. The hierophant was required to be of mature age and clear voice; he seems to have held the office for life, but the statement that celibacy was required is of doubtful value. The hierophant laid aside his own name on assuming his office and henceforth was known only as Hierophantes, though his father's name and his deme are appended as in the case of personal names. Since he had inherited the functions of the old priest king, his costume was that usually worn by kings in tragedy. Consult: Johannes Töpffer, *Attische Genealogie* (Berlin, 1889): Foucart, *Les grands mystères d'Eleusis* (Paris, 1900); Pringsheim, *Archäologische Beiträge zur Geschichte des eleusinischen Kults* (1905). See MYSTERIES.

HIEROSOLYMA, hî'ēr-o-sûl'î-mâ. See JERUSALEM.

HIGDEN, RANULF (?-1364). An English chronicler and monk of the Benedictine Order. He entered St. Werburgh's monastery at Chester in 1299 and is remembered chiefly for his *Polychronicon*, printed in the English version (dated 1387) of John of Trevisa, by Caxton in 1482, by Wynkyn de Worde in 1495, and by Peter Treveris in 1527. It is a universal history in seven books, extending down to Higden's own day. The events after 1342 are recorded by other pens, and the whole has been edited and translated for the "Rolls Series" (9 vols., 1865-86).

HIGGINS, ANTHONY (1840-1912). A United States Senator, born at Red Lion Hundred, Del. He graduated at Yale in 1861, studied at Harvard Law School for one year, and in 1864 was admitted to the Delaware bar. From 1869 to 1876 he was United States District Attorney for Delaware and in 1881 received the Republican vote of the Delaware Legislature for United States Senator. In 1889 he was elected to the Senate. He was counsel for Judge Charles Swayne in his impeachment before the United States Senate in 1905.

HIGGINS, DAVID WILLIAMS (1834-). A Canadian editor and legislator. He was born in Halifax, Nova Scotia, but early came to the United States and was educated in Brooklyn, N. Y. Removing to California in 1856, he founded the *San Francisco Morning Call*, which he published until 1858. He then went to Victoria, British Columbia, where he established the *Morning Chronicle*; this paper was later amalgamated with another journal, and from 1862 to 1886 he edited and published it under the name of the *Colonist*. In 1906-07 he edited the *Vancouver World*. Activity as a Conservative brought him a seat in the British Columbia Legislature in 1886. He remained a member until 1898 and for the last eight years of his service was Speaker. In 1892 he was a member of the Royal Commission on Fisheries. He published *The Mystic Spring and Other Tales of Western Life* (1904) and *The Passing of a Race* (1905).

HIGGINS, FRANK WAYLAND (1856-1907). An American politician, born at Rushford, N. Y.,

and educated at Riverview Military Academy, Poughkeepsie, N. Y., where he graduated in 1873. He was successively sales agent and partner in a Michigan mercantile firm and became interested in timber lands. He was New York State Senator for the Fiftieth District from 1894 to 1902 and Lieutenant Governor for the term 1903-05. He was elected Governor on the Republican ticket for the term 1905-07.

HIGGINS, MATTHEW JAMES (1810-68). An English essayist and pamphleteer, often called by his pen name "Jacob Omnium." He was born at Benown Castle and was educated at a school near Bath, at Eton, and at Oxford. In 1847 he became an ardent Peelite and wrote for the *Morning Chronicle*. He was most famed for his letters to the *Times*, over such signatures as "Paterfamilias," "Mother of Six," and "A Thirsty Soul," in which he exposed many abuses; and for his contributions to the *New Monthly Magazine*, where he first (1845) appeared as "Jacob Omnium," in a satire on mercantile dishonesty; for his essays in the *Edinburgh Review*, the *Cornhill*, under the editorship of his friend Thackeray, and in the *Pall Mall Gazette*. Several of his essays were reprinted under the title, *Essays on Social Subjects* (1875), with a memoir by Sir William Stirling-Maxwell.

HIGGINSON, FRANCIS (1587-1630). An English Puritan clergyman and one of the first ministers of Salem, Mass. He graduated B.A. at Cambridge University, England, in 1609 and M.A. in 1613, received his first charge in the Anglican church in Claybrooke, Leicestershire, two years afterward, and later was appointed preacher at St. Nicholas, Leicester. Falling under the influence of the Rev. Arthur Hildersam, he became a Nonconformist and was suspended about 1627, but continued working among his parishioners as a lecturer and as a tutor to young men preparing for a university course, until, proceedings being instituted against him in the High Commission Court, he applied for a position as minister to one of the settlements of the Massachusetts Bay Company. He arrived at Salem in June, 1629, and was appointed assistant minister to Samuel Skelton, but died 14 months later, Aug. 6, 1630. He was author of "A True Relation of the Last Voyage to England, etc., written from New England, July 21, 1629," printed in chap. xi of Young's *Chronicles of the First Planters*, etc. (1846), and of *New England's Plantation, or a Short and True Description of the Commodities and Discommodities of that Country* (3d ed., London, 1630). Consult Felt, "Life of F. Higginson," in *Annals of Salem* (Boston, 1845), and Higginson, *Life of Francis Higginson* (New York, 1891).

HIGGINSON, FRANCIS JOHN (1843-). An American naval officer, born in Boston. Graduating from the United States Naval Academy in 1861, he served throughout the Civil War, participating in the bombardment and passage of Forts Jackson and St. Philip, in the attack on the Chalmette batteries, in the capture of New Orleans, and in the engagement at Fort Sumter. Thereafter he served with various squadrons and at different naval stations, had charge of the Naval Training Station at Newport, R. I., in 1887-90, and became captain in 1891. During the Spanish-American War he commanded the *Massachusetts* and was promoted to commodore in 1898 and rear admiral in 1899. He served as chairman of the light-house board from 1898 to 1901, was commander

in chief of the North Atlantic fleet in 1901-03, and had charge of the Navy Yard at Washington from 1903 until his retirement in 1905. He published *Naval Battles in the Century* (1903).

HIGGINSON, HENRY LEE (1834-). An American banker and philanthropist, born in New York. He entered Harvard in 1851, spent some time in a counting house, then went to Vienna and studied music. During the Civil War he served with the First Massachusetts Cavalry and was brevetted lieutenant colonel. In 1868 he became a member of the banking and brokerage firm of Lee, Higginson & Co.; later he was made president of the Submarine Signal Company and of the Gauley Coal Land Company and director in other important corporations. An appreciative and liberal patron of music, he served as president of the New Boston Music Hall and as trustee of the New England Conservatory, and founded (1881) and maintained the Boston Symphony Orchestra. In 1893 he was elected a fellow of the Corporation of Harvard, to which university he gave largely. His benefactions to charity were also notable. His prominence in all these fields of activity throughout a long life gave him the name of "Boston's first citizen." He received the Harvard honorary A.M. (1882) and the Yale LL.D. (1901). See BOSTON SYMPHONY ORCHESTRA.

HIGGINSON, THOMAS WENTWORTH (1823-1911). An American author and soldier, born in Cambridge, Mass., of a distinguished New England family descended from Francis Higginson. He graduated at Harvard in 1841 and after studying at Harvard Divinity School became pastor in 1847 of the First Religious Society (Unitarian) in Newburyport; but in 1850 he gave up this charge because of antislavery convictions and in the same year was an unsuccessful candidate for Congress. After a six years' pastorate in Worcester, Mass. (1852-58), he left the ministry, was active in the antislavery agitation, especially in Kansas, served with distinction in the Civil War as colonel of the first regiment of freed slaves, was wounded in 1863, and, after peace, devoted himself to literature, education, and the political rights of women. He resided till 1878 in Newport, but afterward made his home at Cambridge. He was a member of the American Academy of Arts and Letters. Among the more noteworthy of many volumes are: *Outdoor Papers* (1863); *Malbone: An Old-Port Romance* (1869); *Army Life in a Black Regiment* (1870); *Atlantic Essays* (1871); *Old-Port Days* (1873); *Young Folks' History of the United States* (1875; trans., French, 1875; German, 1876); *Short Studies of American Authors* (1879); *Common Sense about Women* (1881), in which, as in his later *Women and Men*, he stands for equality of rights and opportunities for men and women; *Life of Margaret Fuller Ossoli* (1884); *Larger History of the United States* (1885); *Women and Men* (1887); *Concerning All of Us* (1892). His later volumes, beginning with *Cheerful Yesterdays* (1898), continued by *Old Cambridge* (1899) and *Contemporaries* (1899), mainly deal with the interesting group of which he was almost the sole survivor. He wrote also: *Longfellow* (1903), in the "American Men of Letters Series"; *Whittier* (1903), in the "English Men of Letters"; the autobiographic *Part of a Man's Life* (1905); *Life of Stephen Higginson* (1907). His books are of a piece with his character as a man of generous and fine ideals, forward-looking, and

with the full courage of his convictions. He was an optimist, a lover of his kind, finding delight in nature and in art, and expressing himself with the vigor of strong opinions, the lucidity of a clear thinker, and the point and grace of an accomplished man of letters. Higginson's collected works were published in seven volumes in 1900. Consult: F. B. Sanborn, *Recollections* (2 vols., Boston, 1903); M. E. Phillips, *Boyhood of T. W. Higginson* (ib., 1908); M. P. Higginson (Mrs. T. W. Higginson), *T. W. Higginson: The Story of his Life* (ib., 1914).

HIGGINSVILLE. A city in Lafayette Co., Mo., 55 miles east of Kansas City, on the Chicago and Alton and the Missouri Pacific railroads (Map: Missouri, C 2). A State Confederate Home is situated here. The city is of importance as a grain, poultry, and coal market, several coal mines being operated in the vicinity, and has flour mills, machine shops and foundry, brickworks, a large beehive factory, etc. The water works and electric-light plant are owned by the municipality. Pop., 1900, 2791; 1910, 2628.

HIGGS, HENRY (1864-). An English economist and administrator. He was educated at University College, London, and at the University of Berlin, became a barrister in 1890, and after serving in the Post Office was transferred in 1899 to the Treasury. He was private secretary to several eminent men, including Sir Spencer Walpole, Austen Chamberlain, the Duke of Devonshire, and Sir Henry Campbell-Bannerman. In 1902-03 he reorganized the civil service of Natal and afterward became acting inspector general of the Egyptian Department of Finance. In 1892-1906 he was an editor of the *Economic Journal*. He edited Jevons's *Principles of Economics* (1905) and Giffen's *Statistics* (1913), and wrote a standard work on the *Physiocrats* (1897), which appeared in a Russian version.

HIGH/BIND'ERS (probably *high*, in slang sense + *binder*, variant of *bender*; spree). A name used in California to designate certain disorderly and dangerous Chinamen domiciled there. They are not connected with the Six Companies (q.v.), nor are they regularly organized, but act in an irresponsible, lawless way for and among themselves. They are men without definite occupation, living as best they can upon the Chinese communities, as keepers of evil resorts, gamblers, parasites upon prostitutes, thieves, and criminals generally. The name was originally applied to any rough and was in use in New York and Baltimore as early as 1849, but has gradually become restricted to its present application.

HIGH COMMISSION, THE COURT OF An extraordinary tribunal, famous in English history, originating under the Act of Supremacy during the first year of Elizabeth's reign, which authorized the Queen to appoint an ecclesiastical commission to reform or correct all "heresies, errors, schisms, abuses, contempts, and enormities whatsoever." In July, 1559, Elizabeth granted a commission to "Matthew Parker, nominate Bishop of Canterbury, and Edmund Grindall, nominate Bishop of London," with 17 laymen, constituting them a court for the whole realm. The laymen seldom served, and the work of the court was prosecuted chiefly by bishops and lawyers. It might proceed by witness, with or without a jury, or in any way it should deem proper. It might compel attend-

ance on mere suspicion, examine either the witnesses or the accused "upon their corporal oath," and commit them to "ward" for disobeying its summons or any of its decrees.

The tribunal was created primarily to administer the Acts of Supremacy and Uniformity. As already seen, this first commission authorizes the use of the oath *ex officio*, through which the accused might be forced to convict himself. "This procedure, which was wholly founded on the canon law, consisted in a series of interrogations so comprehensive as to embrace the whole scope of clerical uniformity, yet so precise and minute as to leave no room for evasion, to which the suspected party was bound to answer" upon his "corporal" oath. According to Strype, the oath *ex officio* was the ground of much of the popular hatred of the High Commission. That tribunal was regarded as a kind of ecclesiastical star chamber; and, in fact, the relations of the two bodies were very close. The real activity of the High Commission began in 1583, immediately following a Jesuit plot to assassinate the Queen, and on the succession of Whitgift to the office of Archbishop of Canterbury. He established practically a new commission with enlarged powers and administered the oath with such rigor that his inquisition was comparable to those of Rome and Spain. The operation of the commission was continued during the reigns of James I and Charles I, until, hated by the people and opposed by the law courts, it together with the Star Chamber was abolished by the Long Parliament in 1641. It was restored in a modified form by James II in 1686, but was definitely abolished in 1688. The commission issued by Elizabeth authorized the commissioners to act throughout the whole kingdom; but in practice their jurisdiction was restricted to the Province of Canterbury or southern England. "There is evidence to show that during, at all events, the greater part of the period 1559-1640, a northern commission was sitting at York, Durham, Ripon, or elsewhere, and discharged functions analogous to those discharged by the southern commission at Lambeth, Fulham, Croydon, or Canterbury." (Prothero, *Select Statutes*, xlv.) There was also a commission for Ireland, and until 1606 commissions were sometimes issued for particular dioceses. The text of the principal commissions and other documents may be found in Prothero's *Select Statutes* (Oxford, 1894). Consult also: Hallam, *Constitutional History* (new ed., London, 1876); Strype, *Annals*, vol. iii (4 vols., new ed., Oxford, 1824); Burn, *The Star Chamber: Notices of the Court and its Proceedings, with Notes on the High Commission*; Gardiner, *Report of Cases in the Court of Star Chamber and High Commission, 1631-32*, in Camden Society, new series, vol. xxxix (Westminster, 1886); and the histories of Green, Ranke, and Gardiner.

HIGH COURT OF JUSTICE. In the English judicial system that part of the Supreme Court of Judicature which has general original jurisdiction in all causes, civil and criminal. It is organized in three divisions for the administration of justice, viz., the Chancery Division, the King's Bench Division, and the Probate, Divorce, and Admiralty Division. An appeal lies from any of the divisions to the other part of the Supreme Court, the Court of Appeal, and from that tribunal to the House of Lords. The High Court is the modern successor of the numerous independent tribunals which had sprung

into being to meet the demands of an expanding civilization, and which had for many centuries divided the administration of justice among them. The principal of these were the Superior Courts of Common Law (King's Bench, Common Pleas, and Exchequer), the High Court of Chancery, the Court of Admiralty, and the Probate and Divorce Court. These were all merged in one by the enlightened piece of legislation known as the Judicature Act (q.v.), passed in 1873. (See also COURT; SUPREME COURT.) The term "high court" was also formerly applied to the Court of Chancery (see CHANCERY), to Parliament when acting in a judicial capacity (see PARLIAMENT), and to the Court of Delegates (see DELEGATES, HIGH COURT OF).

HIGHER CRITICISM. See BIBLICAL CRITICISM.

HIGHER LIFE, THE. A term which became current particularly in certain circles of Protestantism, about the middle of the nineteenth century, for a Christian life of complete harmony with God. It is also called entire holiness, full salvation, and Christian perfection. The doctrine has various forms. 1. Complete sinlessness may be reached by a single act of complete consecration to God, continuing according to some during life, according to others for indefinite periods. The objection to this claim is twofold. Complete sinlessness does not seem to be established as a fact. Nor is any previous state, founded on a consecration of self to God which is less than complete, truly a Christian state at all. 2. The state is one of perfection of Christian love, by grace made supreme in the soul. Most sin would necessarily be excluded by such a love, and errors that were objectively wrong would not be subjectively sins, because not intended as such. The question as to this form of the doctrine is one of fact. Is there reason to believe that given individuals are thus under the domination of uninterrupted, perfect love? 3. The state is attained by conformity to the actual demands of God, which are lowered from the strict standard of ideal perfection to meet the capacity of our feeble natures. This theory confounds the standard of conscience and the demands of God with what may be effected as a rational probability that men shall attain. Consult Boardman, *The Higher Life Doctrine of Sanctification, Tried by the Word of God* (Philadelphia, 1877), and Johnson, *The Highest Life* (New York, 1901).

HIGHGATE, hī'gāt. A northern, hilly section of metropolitan London, in Middlesex, 5 miles north-northwest of St. Paul's (Map: London, C 7). It commands a fine view of the city and has many elegant villas. In Waterlow Park are the Lauderdale House, once occupied by Nell Gwynne, and the Cromwell House. Very famous are the Whittington almshouses, founded by London's famous lord mayor. The Highgate, or North London, Cemetery contains the graves of numerous celebrities, including Lord Lyndhurst, George Eliot, Herbert Spencer, Coleridge, and Faraday.

HIGH'HOLE' (variant of *highhoe*, *heighaw*, *haikow*, possibly onomatopoeic in origin; connected by popular etymology with *high* + *hole*). A local name in the United States for the flicker (q.v.). heard in many forms, and having many relatives in the provincial speech of both Great Britain and America. Consult *Bulletin Nuttall Ornithological Club* (Cambridge, 1881).

HIGHLAND, or KY'LOE, CATTLE. A

race of small hardy cattle, of the western "Highlands" of Scotland, descended from ancient stock and noted for their shaggy, usually reddish, coats and hardy constitutions. They are comparatively short-horned and feed in a semiwild condition upon the hilly moors. See Plate of WILD CATTLE, under CATTLE.

HIGHLANDERS. Scottish regiments of the British army, the oldest of which is the Black Watch (q.v.), founded in 1668. The Scottish social structure and conditions generally offered peculiar facilities for good recruiting—which fact, together with their proved military qualifications, encouraged the British government in the organization of the following regiments:

ORIGINAL TITLE	Date of formation	Present territorial title
Black Watch, The . . .	1704	Royal Highlanders, The
71st Highlanders . . .	1777	Highland Light Infantry
Ross-shire Buffs . . .	1777	Seaforth Highlanders
74th Highlanders . . .	1787	2d Batt. Highland L. I.
Duke of Albany's Own	1793	2d Batt. Seaforth Highl'ders
Cameron Highlanders	1805	Queen's Own, Cameron Highlanders
Gordon Highlanders	1796	2d Batt. Gordon Highl'ders
Sutherland Highl'ders	1800	2d Batt. Argyle and Sutherland Highlanders
Other Scottish regiments (not Highlanders) are:		
Cameronians . . .	1688	Scottish Rifles
The Douglas Reg't.	1680	Royal Scots, Lothian Regt.
Scots Fusilier Guards	1660	Scots Fusiliers

The personnel of the Highland regiments is no longer confined to Scottish officers and men.

HIGHLAND FLING. One of the distinctive national dances of Scotland. It is ordinarily danced by three or four persons to the music of the strathspey (q.v.). The time is $\frac{4}{4}$, and most of the music is distinguished by an extended use of syncopation. Its name is derived from the peculiar, flinging action of the steps as the performer dances alternately on each leg, throwing the other out in front and behind. Like all Scottish dances, the Highland fling is animated, sharp, and vigorous.

HIGHLAND MARY. A poem by Robert Burns (1792), celebrating his affection for Mary Campbell, a nursemaid in the family of Gavin Hamilton and daughter of a sailor settled near Dunoon. She died shortly after their betrothal.

HIGHLAND PARK. A city in Lake Co., Ill., 23 miles north of Chicago, on Lake Michigan, and on the Chicago and Northwestern Railroad (Map: Illinois, J 1). Picturesquely situated on wooded bluffs 100 feet above the lake, it is a popular residential suburb of Chicago and has the Northwestern Military Academy, Deerfield-Shields High School, and a Carnegie library. There are also municipally owned water works. Fort Sheridan (q.v.) adjoins the city north. Pop., 1900, 2806; 1910, 4209.

HIGHLAND PARK. A village in Wayne Co., Mich., about 10 miles north of Detroit (Map: Michigan, F 6). The chief industry is the manufacture of motor cars and motors. One of the largest automobile plants in the country is situated here. Under a revised charter of 1912 Highland Park is governed by a president and four councilmen. Pop., 1900, 427; 1910, 4120.

HIGHLANDS. A name applied to the mountainous region north of and including the Grampian Mountains in Scotland. This district

has no political or civil boundary and is separated by only a vague line of demarcation from the division called the Lowlands. It may be briefly described as that portion of the north and northwest of Scotland in which the Celtic language and manners have lingered until modern times. See GREAT BRITAIN. Consult also Browne, *History of the Highlands and the Highland Clans* (4 vols., 1838).

HIGHLANDS OF THE HUDSON. A group of mountains extending in a southwest-northeast direction through Rockland, Orange, Putnam, and Dutchess counties, N. Y., and forming a northerly continuation of the Blue Ridge of Pennsylvania and New Jersey. The Hudson River crosses the mountains through a winding gorge whose sides rise abruptly in places to peaks about 1500 feet above the water. The region abounds in beautiful scenery and has great historic interest. Stony Point and West Point, two promontories on the west side of the river, were the scenes of stirring struggles during the Revolution. See HUDSON RIVER; NEW YORK.

HIGH LIFE BELOW STAIRS. An amusing farce by James Townley (1759). See LADY BAD.

HIGHNESS. See TITLES OF HONOR.

HIGH PLACE (Heb. *bāmāh*, height). An expression frequent in the Old Testament and invariably used (except in poetry) as a designation of a sanctuary. All worship in ancient Israel was conducted at high places, and there was therefore a very large number of such shrines. Generally they were located on the top of a hill or a mountain, which accounts for the name; but sometimes a *bāmāh* was within a city, at the gate, or in a valley, not necessarily even on an artificial mound, as has been supposed. At such a high place there would be an altar, a sacred stone of phallic shape, a wooden post, a sacred tree, or often a sacred fountain. While some may have been only small shrines, others had large halls where the worshippers took part in the sacrificial meal, as well as an *adytum* for the image of the deity. There probably was an idol in every such temple. At Bethel and Dan there were bull images of Yahwe, at Jerusalem a brazen serpent as well as bulls. The worship at these sanctuaries was in earlier times characterized by joy, by eating, drinking, dancing, and sexual indulgences. This rejoicing was hallowed by offerings of sacrifices, libations, and intercourse with the hierodules. As most of these high places were taken over from the Canaanites, and the denunciations of the prophets show the continuance in Israel, even at a late date, of the worship of the Baals, it is probable that with Yahwe other deities, also, especially the *Baalim* or *Elm* (lords or gods) to whom the sanctuaries had once belonged, were recognized by sacrifices in these temples. That these high places were once regarded as altogether legitimate is evident from the fact that Samuel conducted worship at a number of them, David, Solomon, and all his successors down to Josiah sacrificed in them, and at these sanctuaries the stories of the patriarchs were told. Many of the stories of Genesis cluster about the high places of Shechem and Bethel, Mizpah and Mahanaim, Hebron and Beersheba, and Beer-lahai-roi. But the prophets of the eighth century, men like Amos and Hosea, Isaiah and Micah, denounced these temples of the nation and the sacrificial cult

there carried on. They maintained that Yahwe had not commanded that sacrifices be brought to Him, that Israel was happiest and most pleasing to Yahwe when no sacrifices could be offered, viz., in the wilderness. While the earliest law of Israel, the Covenant Code (Ex. xxi-xxiii), regards worship at those sanctuaries where Yahwe had revealed Himself as perfectly legitimate, the Deuteronomic law introduced by King Josiah about 620 declares that sacrifices shall be offered in only one place. This centralization of the cult in Jerusalem may have been an ideal of the local priesthood as early as the days of Hezekiah, and some Judæan temples may have been closed and destroyed as is stated in 2 Kings xviii. 4, 22; xxi. 3, though some scholars hold that the author of these verses has wrongly given Hezekiah credit for the same reformatory work as Josiah. That Josiah attempted to carry out the change proposed in Deuteronomy and did so with a high hand, there can be no doubt (2 Kings xxiii). But it is equally certain that the affection of the people could not by his violent measures be diverted from their ancient temples. The destruction of the temple in Jerusalem by Nebuchadnezzar naturally enhanced the importance of the smaller shrines and caused a reaction against the Yahwe cult in favor of the worship of other gods. There is evidence in parts of the Book of Isaiah written during the Persian and Greek periods of the survival of licentious and idolatrous rites that can scarcely be connected with the temple in Jerusalem. A positive proof of the existence of other temples besides that in the capital at a very late time is found in the Aramaic documents belonging to the Jewish military colony on the island of Elephantine in Egypt, where a Yahwe temple existed probably from the end of the seventh century to 411 B.C. (see ELEPHANTINE PAPYRI), and also in the letter of Onias to Ptolemy and Cleopatra, quoted by Josephus (*Ant.*, xiii, 3, 1), in which he states that the Jews of Egypt, Coele-Syria, and Phœnicia have many temples of different patterns and therefore wishes to have permission to build his temple in Leontopolis (see ONIAS'S TEMPLE), on the model of that in Jerusalem. From this it must be concluded that the idea of the illegitimacy of all worship except at Jerusalem cannot have been universally cherished among the Jews. Consult: Von Gall, *Altisraelitische Kultstätten* (Giessen, 1898); Moore, "High Place," in *Encyclopædia Biblica* (1903); Schmidt, *Journal of Biblical Literature*, vol. xxxiii (Boston, 1914).

HIGH POINT. A city in Guilford Co., N. C., 78 miles northeast of Charlotte, on the Southern and the Carolina and Yadkin River railroads (Map: North Carolina, C 2). It has several furniture and wood-working mills, car shops, and produces furniture, safes, buggies, cotton, tobacco, hosiery, silk, bricks, etc. Settled in 1840 and first incorporated in 1858, the city has adopted the commission form of government. It owns and operates its water works and electric-light plant. Pop., 1900, 4163; 1910, 9525; 1914 (U. S. est.), 11,810.

HIGH PRIEST (Heb. *kohen hakohen hagadol*). The chief of the Jewish priesthood. There is no evidence that in the preëxilic period there was any distinctive office of high priest. In early days among the Hebrews the rulers united in their persons priestly and civil functions, and to a certain extent the kings of Israel and Judah continued to perform offices of a priestly

character. By the side of the king priest there were guardians of the sanctuaries scattered throughout the country, and as some of those (e.g., at Shiloh, Bethel, Samaria, and Jerusalem) grew in importance, an ecclesiastical government gradually developed, and naturally in such significant centres as Samaria and Jerusalem there was always one priest who was regarded as supreme over the others. In the Deuteronomic code there is no reference as yet to the high priest as such, nor does Ezekiel make mention of such an office in his sketch of the future theocracy. Deuteronomy makes no distinction between priests and Levites; in Ezekiel the priests are members of the Zadokite family, to whom is assured control of the temple at Jerusalem, while the Levites are the body servants of the priests and represent those attached to the old sanctuaries of the country, which were set aside with the establishment of the principle of central authority for the temple of Jerusalem. (See DEUTERONOMY.) After the fall of the Davidite dynasty, and after Judah became a part of the Chaldean and Persian empires, the chief priest in Jerusalem became the head of the theocracy and the official representative of the nation. This seems to be reflected in the Pentateuch. In certain priestly additions to this work probably made in the Persian period (see EZRA; LEVITICUS; PENTATEUCH) the prerogatives of the Zadokites are thrown aside, and the priesthood is fixed by Moses himself in the family of his brother Aaron. The latter is accorded the dignity of high priest, and the office is handed down to Aaron's third son, Eleazar, and by the latter to his son, Phinehas, and so in regular succession. The regulations for the office are set forth in great detail in Lev. viii, x, xxi, and other passages; but it must be borne in mind that these regulations remained to a certain extent in the domain of theory. Many more restrictions were attached to the office than belonged to the ordinary office of a priest. The high priest was allowed to marry none but a virgin and one of his own tribe; every impure contact, even of the dead bodies of his own parents, he was strictly forbidden, besides many other things that might cause defilement. His functions consisted principally in the general administration of the sanctuary and all that belonged to the sacred service. He alone was allowed to enter the Holy of Holies on the Day of Atonement and to consult the Urim and Thummim (q.v.). His costume was of surpassing costliness and splendor, comprising numerous vestments in addition to those of the ordinary priests. This costume was laid aside by the high priest when, on the Day of Atonement, he went to perform the service in the Holy of Holies; a simple garb of white linen—the funeral dress of the Jews in later times—was all he wore on that occasion. The revenues of the high priest were in the main the same as those of the other priests; but, according to the Talmud, he was to be richer than these, and if his own means were insufficient, he was to be provided with means by his brethren, in virtue of his position. The other priests never addressed the high priest but by *ishi kohen gadol* (my lord high priest). Before the law, however, the high priest was equal to any other Israelite. See AARON; LEVITE; LEVITICUS; PRIEST.

HIGH SCHOOLS. A term that has been

variously employed in different countries at different times to indicate a type of schools. In Germany in official language it is customary to refer to the universities as high schools (*Hochschulen*). In the middle of the sixteenth century in Edinburgh the designation was applied to a famous educational institution of a liberal character, but in grade below the university. In the United States it is very generally used to indicate an important and definite type of schools which forms a component part of the public-school system. This term came into use between 1820 and 1850, when, in place of or by the side of schools called "academies," which were maintained by endowment or at private expense, schools of a corresponding grade were established at public expense. Such institutions were variously designated at first. In Philadelphia the Central High School yet retains its original name; in New York the corresponding institution was known first as the Free Academy and later as the College of the City of New York. This institution has since expanded in scope until it offers approximately the ordinary college course. The Boston Latin School, founded in early Colonial times, is a free public high school, fitting boys for college.

The term "high school" came into use in Boston when in 1821 the English High School was established as complementary to the Latin School. A few years later the Girls' High School was founded. During the period of Horace Mann's secretaryship of the Massachusetts Board of Education (1837-48) a system of high schools was instituted. This example of Horace Mann was followed by other educational leaders, notably by Henry Barnard in Connecticut. From the middle of the nineteenth century the movement in the establishment of high schools became very general. In many of the Western States high schools have from the first formed a part of the public-school system, and in some instances their maintenance is recognized by the constitution of the State. During the year 1912-13 there were reported to the United States Commissioner of Education 11,277 public high schools, having an attendance of 1,134,771 pupils. The proportion of high-school students to the scholastic population was about three times as great as in 1890, while about 23 per cent of the children of this generation in the United States receive some education in the high schools. The courses of study, the terms of admission, and the length of time required for completing the instruction differ widely; but in general the term "high school" in the United States means a school supported from the public treasury, where tuition is usually (but not necessarily) free, and where pupils of both sexes are carried forward from the grammar schools to the study of "higher" branches, and thus fitted for active life or for admission to universities, colleges, and technical schools. In its origin the high school, as also the academy, arose in answer to the demands for schools of a lower grade than colleges, appealing to a wider constituency and satisfying more needs. For the most part the high school yet retains these characteristics. In the central and western Commonwealths of the Union it fits directly for colleges and especially for the State university; but this is due to the fact that there is a very great freedom of choice in regard to the subjects essential for entrance to college and university courses. The adjustment has been made by the college

rather than by the high school, and this adjustment has been adopted very extensively throughout the country. By far the larger part of high-school graduates do not enter college. However, high schools seek to meet various needs, either by offering a variety of courses or in large cities through distinct schools. Thus, there are the classical courses or schools, which are distinctively college preparatory in their nature; the scientific or English courses or schools, which furnish preparation for professional schools or simply equipment in general; there are also of recent years specialized high schools or courses, giving a technical or industrial preparation, and commercial high schools, with a corresponding purpose in view, and more recently agricultural high schools have sprung up. No part of the educational system of the United States is so responsive to local demands and to public opinion. Hence arises the greatest variety of local conditions in these schools in city and country. For the most part they are wholly under local control and are subject to general State supervision of only a nominal character. In some States, such as New York, this supervision is more intimate; in others, such as California or Michigan, it is exercised chiefly through the State universities. This adaptability to local influences constitutes the greatest element of their strength, while at the same time the absence of general standards constitutes a most serious element of weakness. That the public high school is the representative secondary school of the United States is indicated by the fact that during 1912-13 private secondary schools numbered only 2168, with an attendance of 148,238 pupils. From 1896, when the number of private schools was 2100 and the number of pupils 108,000, there was a steady decline in both the number of private schools and in the attendance as well until 1908-09; but since that date there has been an upward tendency.

Bibliography. Butler, *Education in the United States* (Albany, 1900); Brown, *The Making of our Middle Schools* (New York, 1902); *Reports of the United States Commissioner of Education* (Washington); J. F. Brown, *The American High School* (New York, 1909); H. A. Hollister, *High School Administration* (Boston, 1909); C. H. Johnston, *High School Education* (New York, 1912-14); Monroe, *Principles of Secondary Education* (ib., 1914). See ELECTIVE COURSES AND STUDIES; GRAMMAR SCHOOLS; NATIONAL EDUCATION, SYSTEMS OF; SECONDARY SCHOOLS.

HIGH SEAS. In the most general sense, the open sea, constituting the highway of the ships of all nations. In law, however, the expression has received more specific definition—first, in international law, as describing the public waters lying beyond the territorial waters of a particular nation, and, second, in English and American law, as applied to the waters in which the admiralty courts, as distinguished from the ordinary municipal courts, exercise jurisdiction.

In international law, territorial waters comprise all ordinary arms of the sea—bays, harbors, straits, and tidal rivers, lying wholly within the confines or bounded wholly by the shores of a single nation, together with the littoral strip, 3 miles in width, extending out from the low-water mark of the tide from the shore of a nation. In this sense, then, the high seas may be said to begin at the 3-mile limit.

Within its territorial waters a nation exercises an extensive jurisdiction which is not conceded to any nation on the high seas. Formerly, indeed, certain nations claimed and exercised an exclusive jurisdiction over certain seas or parts thereof, as Venice and Genoa in the Middle Ages over the Adriatic and the Ionian seas, Portugal at a later period over the Indian Ocean, Sweden and Denmark over the Baltic and the Arctic seas, England over the narrow seas, the North Sea, and the Atlantic from Cape Finisterre in Spain to Stadland in Norway, and Russia in the Bering Sea. It was not till the early part of the last century that the last of these pretensions was abandoned, when Great Britain and the United States (1824) united in rejecting the claim of Russia to exclusive dominion over the waters of the Bering Sea, though this claim was revived in part by the United States government in connection with the seal fisheries in those waters. (See **BERING SEA CONTROVERSY**.) For nearly a century, accordingly, the principle of the freedom of the seas has been accepted in principle and in practice by all nations. What this comes to in practice is that the open sea is free to the ships of all nations, whether for purposes of trade or of warfare, subject only to such regulations as may be imposed by international agreement. A ship on the high seas and all those on board are subject to the jurisdiction of the nation whose flag the ship flies, and any nation may regulate the use of the seas by its own ships for the safety of ocean travel, for the prevention of illegal trade or other unlawful practices, and for protecting its interests and fulfilling its obligations as a neutral in time of war. But no nation, unless empowered by treaty, can in any way in time of peace restrict the use of the high seas by the ships, public or private, of other nations, either with respect to navigation or the right of fishing. The only exceptions are the British pearl fishery off Ceylon, which extends to a distance of 20 miles from the shore, and which is based on immemorial usage, and the right of every nation to suppress piracy on the high seas. In time of war, however, a belligerent may exercise the right of search over neutral vessels on the high seas for the purpose of detecting violations of the neutrality laws or of a blockade maintained by it. See **BLOCKADE**; **NEUTRALITY**; **SEARCH**, **RIGHT OF**.

As a term of admiralty law in England and the United States, the high seas include that "part of the sea which lies not within the body of a country." It is used in contradistinction to bays, harbors, and arms of the sea inclosed within the *fauces terræ*, or narrow headlands or promontories of a nation. The high seas—or "the main sea," to use Sir Matthew Hale's expression—are deemed within the exclusive jurisdiction of the Admiralty, up to high-water mark when the tide is full.

This means that the jurisdiction of the admiralty courts in cases of collision, claims to salvage, prize, and other matters coming properly within the cognizance of those tribunals, is not limited to the high seas as defined in international law, but extends to the littoral strip and other waters comprehended within the description of territorial waters as well. Consult the authorities cited under **ADMIRALTY LAW** and **INTERNATIONAL LAW**; also *United States v. Rodgers*, 150 United States Reports, 249 (Washington, 1893).

HIGH STEWARD. In English history, the highest official of state under the Norman kings. The office was brought over by the Conqueror from Normandy; but while it survived in name and in importance for centuries, it did not long retain its preëminence. As early as the reign of William Rufus the great man of the realm next to the King bore the title of Chief Justiciar (*Justiciarius capitalis*). Later the office of Lord High Steward of England—still one of great distinction, but shorn of much of its power—became hereditary in the earls of Leicester. It survives to this day, but only as an honorary or ceremonial office, exercised in connection with the coronation of a new monarch.

HIGH-TEMPERATURE MEASUREMENT. See **PYROMETER**; **THERMOMETER**.

HIGH TREASON. See **TREASON**.

HIGHTS/TOWN. A borough in Mercer Co., N. J., 14 miles east by north of Trenton, on the Pemberton and Hightstown and the Pennsylvania railroads (Map: New Jersey, C 3). It contains the Peddie Institute for boys. There are nurseries, brickyards, and manufactories of rugs and shoes. The borough is situated in a rich agricultural district and owns its water works and sewer system. Pop., 1900, 1749; 1910, 1879.

HIGHWAY. A place over which the public generally has a right to pass. As a term of the common law, it includes roads, streets, footpaths, bridle paths (or ways along which the public is entitled to ride or lead a horse), driftways (or places along which the public may drive cattle), public canals, ferries, bridges with their approaches, and navigable streams. In statutes, however, it is generally used in a narrower sense, being limited to roads or streets.

Ordinarily the right of the public in a highway is that of user, not of ownership; i.e., it is a right to use the land of a private owner for passing and repassing. To this extent it partakes of the nature of an easement (q.v.), but it is not a true easement, because there is no dominant estate to which it is appurtenant, as in the case of a private way. But while this is the usual nature of the highway in England and the United States, it sometimes happens that the "fee" or ownership of the highway, i.e., of the land itself, is vested in the state or the local, municipal authority, as the county or city. Whether a place of passage is a highway or not does not depend upon its being a thoroughfare, i.e., open at both ends or leading to a public place. If the public is entitled to pass and repass, the place is a highway, although its terminus is at the gate of a private house.

Highways are created either by act of the public authorities or by dedication of the landowner and acceptance by the public. Dedication may be either express or implied. It is of the first kind where a landowner formally lays out a public road or street and gives notice that the public may use it. The dedication is implied where the public makes use of a way without objection of the landowner and under circumstances indicating his assent to such use. But mere user by the public, however general and however long-continued, will not of itself and without the owner's assent result in a dedication.

One who sells lots of land purporting to be bounded by a strip of land described as a road or street does not thereby convert such strip into a highway, but only into a private way, or

easement, for the benefit of the holders of the lots so conveyed. But such grants are evidence of a dedication to the public, which becomes effective on its acceptance by the public, evidenced by general user. In the absence of such acceptance the grantor may, by buying back the lots so conveyed or otherwise, extinguish the private easements of the grantees and make whatever use he may choose of the intended highway.

The acceptance by the public, as above indicated, is usually necessary in any case to make a dedication effective so as to prevent the owner of the land from revoking it, but is not in itself always effective to the extent of imposing on the authorities the common-law obligation of keeping the dedicated strip in repair as a highway. But a general user by the public continued for a long time has usually been held to have the effect of giving the dedicated strip the character of a highway for all purposes, including the obligation of the authorities to repair. The acceptance of the dedication is, however, more properly evidenced by some formal act of the authorities chargeable with the duty of repairing or by actual acts of repair or other control exercised by them.

In the United States highways are created more frequently by the act of the public authorities than by private dedication. At times they are established by special legislation, but, as a rule, by local authorities under general statutes. These differ in the various States, although their principal provisions are much alike. They ordinarily require formal application by interested parties for the laying out of a highway; the survey and location of the proposed way by the proper authorities; due notice to the various persons whose property will be directly affected, a proper hearing before certain officers, a proper assessment of damages or of benefits, and a complete record of the proceedings. After a highway has been established, it can be lawfully altered or vacated only by act of government. This may be accomplished by special legislation, though, as a rule, the State delegates its authority over highways to county, town, or city officials. In the United States even the State cannot make, change, or vacate a highway except in strict conformity with the procedure established by law, nor without making compensation to landowners whose property rights are taken away thereby. This is because of constitutional prohibitions against the taking of private property for public use except by due process of law and without just compensation. In England Parliament is not thus hampered by constitutional limitations, although in practice due legal process and compensation are always provided for in such cases by statute.

As has been said above, the ordinary rule, both in England and in the United States, is that the public has only a user of the surface of the highway; the fee of the land remains in the adjoining owner. By virtue of this right of user the public is entitled to use every part of the highway and is not limited to the traveled or beaten part only. Accordingly, if any portion of a highway is unlawfully occupied by a fence, gate, wall, or building, such obstruction is a nuisance and may be abated either by the public authorities or by any traveler whose right to use the road is interfered with. This is one of the few cases surviving in English and American law in which a person is allowed to take the law into his own hands. It is his duty in

such cases to proceed in a peaceable manner, doing no more injury than necessary to the property which constitutes the nuisance. The person who is responsible for the nuisance is liable in damages to any one injured thereby. In some circumstances a traveler has a right to deviate from the highway and go upon adjoining lands. Highways being established for the use and benefit of the whole community, a due regard for the welfare of all requires that, when temporarily obstructed by storm or flood, travel should not be interrupted. A person traveling on a highway is in the exercise of a public right, and if he is compelled by impassable obstructions to leave the thoroughfare and go upon private lands, he is still in the exercise of the same right. But this right of deviation rests upon necessity, not upon the personal convenience of the traveler. It is properly exercisable, therefore, only when the obstructions are due to sudden or recent causes, and when the traveler cannot conveniently make his journey by other ways.

But the owner's rights in his land are not exhausted by his dedication of them for highway purposes. His ownership of the fee is a real thing, subject only to the public right of user which he has conceded or which has been acquired by the condemnation proceedings. He may still exercise all rights of use and dominion not incompatible with the public right. Thus, if a mine were discovered under the road, the adjoining owner would have the sole right to dig it and keep the contents, subject only to the duty of leaving sufficient support for the surface of the road. So, in like manner, where there are strips of land at the side of the road on which trees grow or grass, these belong solely to the adjoining owner, and the public have no right to them. Another consequence of the same rule is that, if a person is loitering on a highway, not with the intention of using it as a traveler, but for some unlawful purpose, such as creating a disturbance or abusing an adjoining property owner, he may be dealt with as a trespasser by the owner of the fee.

The English common law imposed upon the parish the duty of maintaining and repairing all highways. If the duty was neglected, the parish was indictable and was liable for damages sustained by travelers through its negligence. At present the maintenance and general control of highways and bridges in England and Wales are committed chiefly to district and county councils, in accordance with the Local Government Act, 1894 (56 and 57 Vict., c. 73).

In the United States, while every highway is subject to the control of the State or Federal government, comparatively few roads are constructed and maintained directly either by a State or the nation. The power to establish them and the duty of keeping them in repair are generally delegated to some subdivision of the State, such as the township, the county, or the city. The liability of these political subdivisions for their negligent performance of this duty varies in the different States. As a rule, however, they must respond in damages for injuries caused to travelers by defects in highways of which the proper authorities had notice. In some States a township is divided into road districts, and all ordinary repairs are made by the inhabitants of these several divisions, while extraordinary repairs, as well as the maintenance of bridges, devolve upon the township

at large. In other States the unit of highway administration is the county or city.

The Legislature has power to commit the work of improving and repairing highways to private corporations. Accordingly turnpike and similar companies receive from the State authority to construct roads and keep them in good repair and to reimburse themselves by tolls levied upon the members of the public using the roads. By this system the cost of maintaining proper roads is shifted from the property owners of a particular territory to the traveling public; but the cost is still borne as a tax which the State has a right to impose. It is also established that the Legislature of a State may lawfully authorize temporary obstructions in highways and may delegate the exercise of this power to municipal corporations. Hence come city ordinances providing for permits to deposit building materials in city streets, to erect stands, to use apparatus for hoisting goods, and the like. Gas and water companies receive authority to excavate highways and lay pipes; telegraph and telephone companies are permitted to erect poles and string wires along public thoroughfares, and even railroad companies are allowed to lay tracks and run cars over their surface. If the use which such companies are thus authorized to make of the street subjects adjoining property to injuries not contemplated or provided for when the street was laid out, it may give the property owners the right to compensation for these injuries from the users. The use of city and village streets for gas and water mains is generally deemed to be within the scope of the original dedication, but not so in the case of country highways. Railroads, on the other hand, are usually regarded as an encroachment on the rights of the owner of the fee of a road, whether urban or rural, though the contrary has usually been held in the case of street railways.

In England teams meeting upon a highway turn to the left; in the United States they turn to the right. This "rule of the road" has received legislative sanction in some of the States, and penalties are imposed for its violation. Consult: Woolrych, *The Law of Ways* (2d ed., London, 1847); Elliott, *Treatise on the Law of Roads and Streets* (Indianapolis, 1900); *Consolidated Laws of New York—Highway Law*. See PAVEMENT; ROAD; STREET.

HIKONE, hē'kō-nā. A town in the Japanese Prefecture of Higo, situated in the central part of Nippon, on the east shore of Lake Biwa (Map: Japan, E 6). Its chief attraction is the remains of a fine feudal castle, the former seat of a famous Daimio. Pop. (est.), 22,000.

HILALI, hē-lā'lē, BABR UD-DĪN. A Persian Sufi poet of the first third of the sixteenth century, born in Astrabad and educated at Herat. In 1532-33 he was imprisoned and then killed by Ubaid Khan, as a Shiite heretic, although it seems certain that he had long before forsaken the national heresy and become an orthodox Sunnite. His poems include the allegorical epics, *Sifat al-Ashikin* (On the Ways of Lovers) and, most famous of all, *Shāh u Darvish*, or *Shāh u Gadā* (King and Beggar, or King and Dervish), translated by Ethé in *Morgenländische Studien* (1870), and the lyric *Divan*, published at Cawnpore in 1864.

HILARIA (Lat. nom. pl. of *hilaris*, Gk. *hilaros*, *hilaros*, gay). A Roman festival, belonging to the later Empire, celebrated in honor of

Cybele at the vernal equinox. It began on March 22 (or, perhaps, even on the 15th) and closed on the 25th. The last day of the feast was the most important, and on it the inhabitants of the city abandoned themselves to the most extravagant merrymaking. The only religious ceremony in connection with it was the solemn procession of the priests who bore round the streets the statue of the mother of the gods. (See CYBELE.) The festival celebrated the departure of winter and hailed the approach of spring. Consult Marquardt, *Römische Staatsverwaltung*, vol. iii (2d ed., Leipzig, 1885), and Wissowa, *Religion und Kultus der Römer* (2d ed., Munich, 1912).

HILARION, St. (c.290-371). The reputed founder of monachism in Palestine. According to the legendary and untrustworthy account of his life, he was born at Tabatha, near Gaza, was converted at Alexandria, and, attracted by the fame of St. Antony, went to visit the latter in his hermitage and became his disciple. Returning to Palestine with some companions, while still only a lad of 15, he gave away all the property which he had inherited by the recent death of his parents and withdrew into the desert of Majemra, south of Gaza. He observed the most rigid asceticism and after 20 years of this life was rewarded with rapidly growing fame, miraculous gifts being attributed to him; disciples and imitators multiplied to the number of 2000 or 3000, all under the spiritual control of Hilarion. When 63 years old, the death of St. Antony being revealed to him, he went to Egypt and visited the scene of that saint's labors; afterward he proceeded with a favorite disciple, Hesychius, to Sicily, where his popularity rendered the quiet and retirement which were congenial to him impossible. A further migration to Epidaurus thus became necessary, and ultimately he found a resting place in Cyprus, the diocese of his friend Epiphanius, where in a lonely cell among some almost inaccessible rocks he died in 371. He is commemorated by the Roman church on October 21. The original source is Jerome's "Vita S. Hilarionis," in Migne, vol. iii, translated. Consult Israel, "Die Vita Hilarionis des Hieronymus," in *Zeitschrift für wissenschaftliche Theologie* (Jena, 1880), and Winter, *Der literarische Charakter der Vita S. Hilarionis* (Zittau, 1904).

HILARY, St. (Lat. *Hilarius*). Pope, 461-468 A.D. He was an earnest promoter of the faith and strengthened the ecclesiastical organization, especially in France and Spain. During his pontificate canons were adopted forbidding the ordination of men who had married a second time or those who had married widows and also forbidding bishops to nominate their successors. He is a saint in the Roman calendar, and his day is September 10. Some of his letters are in *Epistolæ Romanorum Pontificum*, edited by Theil, vol. i (Braunsberg, 1868).

HILARY, St., BISHOP OF ARLES (401-449). A churchman whose name occupies a conspicuous place in the history of the fifth century. He was born at Arles and was made Bishop there in 426. As Metropolitan Bishop, he became involved in a serious controversy with the Pope, Leo the Great. A bishop, Chelidonius, whom he had deposed, appealed to Rome and his condemnation was reversed; but Hilary refused to submit to the decision, maintaining that the authority was uncanonically exercised. Hilary was excommunicated and at last submitted to

the Pope, and the dispute was amicably terminated. The occurrence was of importance for the later relation of the French church to the papal see. Hilary died at Arles in 449. His works are in Migne, *Patrol. Lat.*, i. His day is May 5.

HILARY, ST., BISHOP OF POITIERS (c.300–367). He was born of pagan parents at Poitiers. His conversion to Christianity was mainly the result of his own study. About the year 353 he was elected Bishop of his native city and immediately rose to the first place in the Arian controversy. Having provoked the displeasure of the court party, he was imprisoned and sent into exile in Phrygia (356), but appeared in the Council of Seleucia in 359 and was permitted to resume possession of his see, where he died. The Church holds his day on January 14. Hilary's theological writings are especially valuable for the history of the Arian party and particularly for the doctrinal variations of that sect and the successive phases through which it passed between the Council of Nicæa and the first Council of Constantinople. The best edition is that of the Benedictine Dom. Constant (Paris, 1693), or the reprint of it with additional matter by Maffei (Verona, 1730; in Migne, *Patrol. Lat.*, ix and x). His selected works, with biographical and critical introductions, have been translated in the *Nicene and Post-Nicene Fathers*, vol. ix (2d series, New York, 1890). His determined opposition to Arianism won him the epithet "Athanasius of the West." Consult Adolf Harnack, *History of Dogma*, vol. iv (Boston, 1899), and for his life, J. G. Cazenove (London, 1883) and Largent (Paris, 1902).

HILARY TERM. In English law, one of the four terms held for the administration of justice by the Supreme Court of Judicature and named from the saints' days nearest to the date of beginning the terms. Hilary term was named from the festival of St. Hilary of Poitiers and was formerly appointed to commence on January 11 and to end on January 31. It is now, by statute, a movable term, opening on January 11 and ending on the Wednesday before Easter. See TERM, OF COURT.

In the Inns of Court Hilary Term is one of the four dining terms of the year, beginning on January 11 and ending February 1. See INNS OF COURT.

HILBERT, DAVID (1862–). A German mathematician, born at Königsberg. He studied at the University of Heidelberg and later at the university of his native city, where he graduated in 1884, and where he became an instructor in 1886, associate professor in 1892, and professor in 1893. In 1895 he accepted the professorship of mathematics at the University of Göttingen. Hilbert early gained distinction as author of the theorem that any system of algebraic forms can be expressed in terms of a finite number among them. This includes as a particular case the finiteness of the system of invariants of any given forms, the proof of which had long been sought. But his chief reputation is as a leader in the reduction of geometry to a system of axioms, a great advance beyond the Euclidean system. The fourth edition of his *Grundlagen der Geometrie* appeared in 1913.

HILDA, or **HILD**, ST. (614–680). Abbess of Streaneshalch, later Whitby. She was a member of the royal family of Northumbria

and was baptized by Paulinus (q.v.), with her great-uncle, King Edwin, April 11, 627. During the pagan reaction which followed Edwin's defeat and death Hilda was tempted to settle with her widowed sister Hereswid at the monastery of Chelles, 10 miles from Paris; but she was recalled to England by Bishop Aidan (q.v.), and in 649, two years after her consecration as a nun, she was appointed to succeed Heiu, the abbess of Heorte, or Hartlepool. When, in fulfillment of the vow which he had made before the decisive battle with Penda (Nov. 15, 655), Oswy dedicated his infant daughter to God, it was to the care of Hilda that he intrusted her. In 657 the abbess founded the famous monastery on the cliffs of Streaneshalch, or Whitby, and for the rest of her life ruled over her double community of monks and nuns, among whom were St. John of Beverley and the poet Cædmon. Her day in the Roman calendar is November 17. Nearly all knowledge of her comes from Bede, *Ecclesiastical History*, edition by Plummer (Oxford, 1896); by Mayor and Lunsley (Cambridge, 1879). Consult also Dunbar, *Dictionary of Saintly Women* (London, 1902).

HILDEBERT OF TOURS, tōr (c.1055–c.1133). A French prelate and author, born at Lavardin, near Vendôme. Tradition says he was the pupil of Berengarius of Tours, but this is not established. In 1091 he was made archdeacon and in 1096 Bishop of Le Mans. After some difficulties with the Count of Le Mans, the Bishop found a new enemy in William Rufus, who took the city about 1099 and carried him to England as a prisoner for about a year. He had constant quarrels with the neighboring prelates and finally was in almost open rebellion against the King, Louis VI (the Fat). In 1125, somewhat against his will, he was elected Bishop of Tours. Two years afterward he presided at the Synod of Nantes. Towards the end of his life he was on more amiable terms with the King. The works of Hildebert were edited by Antoine Beaugendre (1708), but far from perfectly, and in part by Baluze and Muratori. They consist of sermons, letters, theological writings, and poems. A collection of the latter was published under the title *Mélanges poétiques d'Hilbert de Lavardin* (1882). The treatise *Tractatus Theologicus*, formerly attributed to Hildebert, is by Hugues of Saint-Victor. Consult Dieudonné, *Hildebert de Lavardin: sa vie, ses lettres* (Paris, 1898).

HILDEBRAND. See GREGORY.

HILDEBRAND, hil'de-brānt. The pseudonym of the Dutch poet Nikolaas Beets (q.v.).

HILDEBRAND. An aged warrior and sage in German legend, the tutor of Dietrich von Bern. He appears in the *Hildebrandslied* and plays a leading part in the *Nibelungenlied* and other legends.

HILDEBRAND, ADOLF E. R. (1847–). A German sculptor, born in Marburg. He studied at the Art School in Nuremberg under Kreling and in Munich with Zumbusch and later worked in Berlin with Siemering. His first great public success was at the Vienna Exposition of 1873, with his marble figure of a "Sleeping Shepherd Boy," his bronze statuette of a "Drinking Boy," and his bust of the philologist Theodor Heyse, which were much admired for their lifelike realism combined with classic perfection of form. Hildebrand had studied in Rome in 1867 and 1868, and in 1874 he settled down in Florence, where he resided for 18 years,

modeling portrait busts, heads, and half figures that reproduce life with extreme realism in the manner of the Florentine artists of the fifteenth and sixteenth centuries, but refined by the nobility of the antique. Among his Florentine busts are those of Clara Schumann, the Grand Duke of Saxe-Weimar, the Duke Karl Theodor, and Ludwig of Bavaria; among his Florentine nudes are the marble "Adam," in the Leipzig Museum, and the "Young Man," in the Berlin National Gallery. For the market place in Jena he designed a fountain in memory of the visit of Prince Bismarck in 1892, and for the Broglie Square in Strassburg a fountain with the bronze figure of "Father Rhine." For Meiningen he created a monument of Brahms, and one of the poet Otto Ludwig as Hermes. Portrait busts by him include Hermann von Helmholtz, Max von Pettenkofer, in the Berlin National Gallery, and Wilhelm von Bode. His best-known portrait relief is that of the German Kaiser. In 1887 he received the great gold medal at the Berlin Exposition, and he became a member of the Berlin Academy in 1892, after which year he lived in Munich. His work shows marked individuality and great constructive ability. Consult Alexander Heilmeyer, *Adolf Hildebrand* (Leipzig, 1902).

HILDEBRAND, BRUNO (1812-78). A German economist and statistician, born at Naumburg-an-der-Saale and educated at Leipzig and at Breslau, where in 1839 he became professor. In 1841 he was appointed to a professorship at Marburg, from which he was suspended in 1846 because of the tone of a contribution to a London paper. He was elected to the National Assembly at Frankfurt from Marburg in 1849, after having been reinstated in his academic position. He went to Zurich as a teacher in the Hochschule in 1851, and five years later to Bern as the head of the new Swiss Bureau of Statistics, which he founded. But, as a result of differences with his superiors, he was dismissed and in 1861 became professor in the University of Jena and director of the Bureau of Statistics. His works comprise: *Nationalökonomie der Gegenwart und Zukunft* (1848); *Die kurhessische Finanzverwaltung* (1850); *Statistische Mitteilungen über die volkswirtschaftlichen Zustände Kurhessens* (1853); *Beiträge zur Statistik des Kantons Bern* (1860). He edited *Jahrbücher für Nationalökonomie und Statistik* (1863 et seq.).

HILDEBRAND, HIL'DE-bränd, HANS OLOF (1842-1908). A Swedish historian and antiquarian, son of the archaeologist and numismatist Bror Emil Hildebrand (1806-84). He was born at Stockholm, studied at Upsala, in 1865 was made amanuensis of the archaeological museum, and in 1879 succeeded to his father's position of state antiquarian. In 1895 he became a member of the Swedish Academy. His special study was Norse archaeology and the related subjects, and his works are: *Svenska folket under hednatiden* (last ed., 1872); *De förhistoriska folken i Europa* (1873-80); *Fynder i Troas och Homeros' Troja* (1878); *Lifvet på Island under sagotiden* (last ed., 1883); *Sveriges medeltid* (1879-97), a history of civilization; the second volume of *Sveriges Historia*, dealing with the mediæval period; *Från äldre tider* (1882); *The Industrial Art of Scandinavia in the Pagan Time* (1882); *Zur Geschichte des Dreiperiodensystems* (1886); *Visby och dess minnesmärken* (1892-93); *The Industrial Art*

of Scandinavia in the Middle Ages (1893); *Sveriges mynt under medeltiden* (1895). In 1872 he founded the *Kunglig Vitterhets Historie och Antiquitets Akademians Månadsblad* and in 1880 became editor of *Antiquarisk Tidskrift för Sverige*.

HILDEBRAND, HIL'de-bränt, RUDOLF (1824-94). A Germanic philologist. He was born in Leipzig and studied there. From 1848 to 1868 he taught in the Thomasschule. In 1864 he began to act as one of the editors of Grimm's *Deutsches Wörterbuch* and five years later became professor of modern German literature and language in the University of Leipzig. His most important works are *Vom deutschen Sprachenunterricht in der Schule und von deutscher Erziehung und Bildung überhaupt* (12th ed., 1910) and *Gesammelte Aufsätze und Vorträge zur deutschen Philologie und zum deutschen Unterricht* (1890). Consult Burdach, *Zum Gedächtnis Rudolf Hildebrands* (Hamburg, 1896), and Laube, *Hildebrand und seine Schule* (Leipzig, 1903).

HILDEBRANDSLIED, HIL'de-bränts-lät'. A fragmentary Old High German poem, the oldest-preserved specimen of German heroic poetry. It is written in alliterative verse and dates from the eighth century. It is known only through a manuscript preserved in the museum at Kassel and written by two monks of Fulda at the beginning of the ninth century on two blank pages of a religious work. It narrates the combat of Hildebrand and his son, Hadubrand, who after many years of separation meet and unknown to each other engage in a duel. The account breaks off without completing the story of the combat. The facsimiles of the manuscript have been published by W. Grimm (1830) and E. Sievers (1872), and a number of annotated editions of the text have appeared. Consult: B. Busse, "Sagengeschichtliches zum Hildebrandslied," in *Beiträge zur Geschichte der deutschen Sprache* (Halle, 1900); Braune, *Althochdeutschen Lesebuch* (ib., 1902); M. Trautman, *Finn und Hildebrand* (Bonn, 1903); F. B. Gummere, *Oldest English Epic* (New York, 1909); I. von Grienberger, *Das Hildebrandslied* (Akademie der Wissenschaften zu Wien, 1908); H. Collitz, *Hildebrandslied* (Göttingen, 1910).

HILDEBRANDSSON, HUGO HILDEBRAND (1838-). A Swedish meteorologist, born at Stockholm. He was educated at the University of Upsala, where he became lecturer (1866) and where he was professor and director of the meteorological observatory (1878-1908). In 1869 he traveled over a large part of Europe, and the next year he wrote *Om organisationen af den meteorologiska verksamheten i utlandet samt förslag till dess ordnande i Sverige*, which became the foundation for meteorological observations in Sweden and Copenhagen. From 1899 to 1907 he was secretary of the International Meteorological Committee, and from 1900 to 1910 a member of the committee on the award of the Nobel prize for physics. He wrote also *Essai sur les courants supérieurs de l'atmosphère dans leur relation aux lignes isobariques* (1874); *Atlas des mouvements supérieurs de l'atmosphère* (1877); *Sur la classification des nuages* (1879; 2d ed., 1880), with photographs; *Die meteorologischen Beobachtungen während der Vega-Expedition* (1881), also in French; *Les orages dans la péninsule scandinave* (1888), with Professor Mohn, and *Wolken-Atlas* (1890), with Koppen and Neu-

mayer—both published in French, German, English, and Swedish; *Atlas international des nuages* (1896), with Riggenbach and Teisseranc de Bort; *Les bases de la météorologie dynamique* (1898-1907), with Teisseranc de Bort; *Rapport sur les observations internationales des nuages* (1903-05).

HILDEBRANDT, hil'de-bränt, EDUARD (1818-68). A German landscape and marine painter, whose most important work was in water color. He was born at Danzig. Starting as a house painter, he studied under Krause in Berlin and under Isabey in Paris. Like many other landscape painters of the period, he roamed the world over in search of "striking views." By 1858 he had already exhausted the possibilities of the Canary Islands, Italy, Sicily, North Africa, Egypt, Nubia, the Sahara, and the Arctic Ocean. In 1862, at the mandate of Frederick William II, he undertook a voyage around the world "to learn from personal view the phenomena that the sea, the air, and the solid earth bring forth beneath the most various skies." He returned after two years with 400 water colors that were exhibited in London in 1866. In 1855 he was made member of and professor in the Berlin Academy. Among his works are: "Brazilian Primeval Forest," "Cave at Staffa" (1865), "Castle Kronborg" (1857), in the National Gallery, Berlin; "Moonrise in Madeira," Corcoran Gallery, Washington; "The Bay of Naples," Metropolitan Museum, New York. His paintings, though full of affectation, are not without technical merit, especially in color.

HILDEBURN, CHARLES SWIFT RICHÉ (1855-1901). An American bibliographer and librarian. He received his education in the private schools of his native city, Philadelphia, and in 1876 became librarian of its Athenæum. His literary work includes the compilation, *A Century of Printing: The Issues of the Press in Pennsylvania, 1685-1784* (2 vols., 1885-86); *Sketches of Printers and Printing in Colonial New York* (1895); and the editorship of the *Statutes at Large of Pennsylvania Prior to 1800* (1888-).

HILDEGARD, St. (c.1098-1179). A German nun, a friend of Bernard of Clairvaux, born at Büchelheim. She founded an abbey near Bingen in 1147, boldly attacked ecclesiastical abuses, and composed many mystical works, of which the best known is the *Scivias* (= *Sci vias domini*; edited in Migne, *Patrologia Latina*, vol. cxcvii) (1513). Consult: Roth, *Die Lieder und die unbekannte Sprache der heiligen Hildegard* (Wiesbaden, 1880); Biography by Schneegans (Barmen, 1891); Pal Frauche, *Sainte Hildegarde* (Paris, 1903).

HILDEN. A town of the Prussian Rhine Province, on the river Itter, situated 9 miles east-southeast of Düsseldorf. It is a growing place, with manufactures of silk and cotton goods, carpets, machinery, steel, iron, tinware, building materials, and furniture. Pop., 1890, 8600; 1900, 11,296; 1910, 16,903.

HILDESHEIM, hil'des-him. The former capital of the bishopric of Hildesheim, in the Prussian Province of Hanover, situated on the Innerste, 21 miles south-southeast of Hanover (Map: Prussia, C 2). It has narrow, irregular streets, old monuments, some quaint, mediæval, highly ornamented façades, and many excellent examples of architecture owing to its having been a German home of the Romanesque and Renaissance art, including particularly the tim-

ber framework features. The surrounding walls of the town have been converted into promenades. There are five Roman Catholic and four Evangelical churches and a synagogue. The Roman Catholic cathedral, erected in the eleventh century and greatly modified, is built partly in the Romanesque and partly in the late Gothic. Its ancient cloisters are exceptionally curious and interesting. Its treasury is rich in objects associated with the lives of Charlemagne, Bishop Bernward, and others. The brass doors and bronze Easter column are richly ornamented with reliefs; there are also a number of gilded sarcophagi, including that of Bishop Godehard. Against the wall of the cathedral stands a rosebush which is 25 feet high and reputed to be 1000 years old. Two of the best examples of Romanesque architecture in Germany are the Roman Catholic church of St. Godehard, erected in the twelfth century and recently restored—a basilica-shaped edifice surmounted by three towers—and the large Evangelical church of St. Michael, founded by Bishop Bernward at the beginning of the eleventh century and containing his tomb. St. Michael has an interesting interior, with good mediæval ceiling paintings.

Hildesheim contains also a number of interesting secular buildings, notably the late-Gothic Rathaus (built in the fifteenth century and restored in 1883-02), adorned with rare frescoes by Prell and possessing valuable archives; and the former butchers' guild house, regarded as perhaps the finest wooden building in Germany. There is an interesting mediæval public square, Altstädter Markt. The environs are pleasant and not without interest. In recent times Hildesheim has been brought into special prominence by the collection of elaborate Roman silver plate (known as the Hildesheimer Silberschatz) discovered near the town in 1868. The collection consists of a complete service for three persons (69 pieces) and is believed to belong to the Augustan age. It is in the Berlin Museum. The educational institutions of Hildesheim include a Roman Catholic Gymnasium, originally founded as a cathedral school in the ninth century, a Lutheran Gymnasium, a seminary for teachers, a theological seminary, an agricultural school, etc. There are also two museums of art and antiquities, including the valuable Römer Museum, and a municipal library of about 50,000 volumes. Hildesheim manufactures iron products, tobacco, sugar, cotton, and woolen goods, machinery, church bells, carpets, preserves, wagons, glass, stoves, etc. The chief articles of commerce are grain, wool, leather, and building materials. Pop., 1890, 33,481; 1900, 42,973, including 14,300 Roman Catholics; 1905, 47,061; 1910, 50,239.

The town existed before the ninth century. It came into great prominence after it was made in 818 the seat of the bishopric of Hildesheim. Under Bishop Bernward (993-1022) Hildesheim became famous for its fine ecclesiastical buildings and religious art productions executed under the supervision of the Bishop. In the thirteenth century the town joined the Hanseatic League and acquired considerable privileges. After continuous struggles with its bishops Hildesheim came, upon the secularization of the bishopric, into the hands of Prussia in 1803, was annexed to Westphalia in 1807 and to Hanover in 1813, and with Hanover passed to Prussia in 1866. Consult: Gottlieb Wachsmuth, *Geschichte von Hochstift und Stadt Hildesheim* (Hildesheim,

1863); Holzer Holzer, *Der Hildesheimer antike Silberfund* (ib., 1870); Karl Lachner, *Die Holzarchitektur Hildesheims* (ib., 1882); Karl Bauer, *Geschichte von Hildesheim* (ib., 1891).

HILDESHEIMER SILBERSCHATZ. See HILDESHEIM.

HILDRETH, RICHARD (1807-65). An American historian, born at Deerfield, Mass. He graduated at Harvard College in 1826, studied law, and began to practice in Boston in 1830. In 1832, however, he abandoned his profession to become editor of the Boston *Atlas*. In the autumn of 1834, being out of health, he went to the South, where he resided nearly two years on a slave plantation in Florida and used his opportunity to study the workings of slavery. The result was a powerful antislavery novel, published in 1836 under the title of *The Slave, or a Memoir of Archy Moore*. It was reprinted in England and in 1852 was republished in America under the title of *The White Slave*. When the annexation of Texas began to attract attention, he published in the Boston *Atlas* a series of articles which did much to intensify the hostility of the Northern people to that scheme. After publishing a *History of Banks* (1837) he passed the winter of 1837-38 in Washington as correspondent of the *Atlas* and, upon his return to his editorial chair, entered warmly into the campaign for the election to the presidency of General Harrison, a life of whom he published in 1839. A year later (1840) he translated Dumont's version of Bentham's *Theory of Legislation*. The same year appeared his *Despotism in America*, a work on the political, economical, and social aspects of slavery. A second edition with an added chapter was issued in 1854. From 1840 to 1843 he resided in Demerara, British Guiana, busying himself in editing two free-labor newspapers. After his return he published a *Theory of Morals* (1844) and a *Theory of Politics* (1853). The work, however, for which he is most remembered is his *History of the United States*, in six volumes (1849-56), in which he attempts to present the founders of the Republic in their true character, without trying to heighten their virtues or disguise their mistakes and faults. The first three volumes treat the period from 1492 to 1789; the second three from 1789 to the close of Monroe's first term (1821). The bias is Federalist, the treatment accurate and vigorous; but the graces of style are lacking, and the work is more consulted than read. In 1855 Hildreth published *Japan as It Was and Is*, and in 1856 *Atrocious Judges*, a compilation from Campbell's *Lives*. For several years, ending with the inauguration of Lincoln as President, he was engaged on the staff of the New York *Tribune*. He went abroad in the summer of 1861 as United States Consul at Trieste and died in Florence.

HILF, ARNO (1858-1909). A German violinist, born at Bad Elster (Saxony). He received his first instruction from his uncle, Christian Hilf, who was concert master in Bad Elster. In 1872 he entered the Leipzig Conservatory, where he studied under David, Röntgen, and Schradieck. From 1878 to 1888 he lived in Russia, occupying the positions of concert master and professor at the conservatory in Moscow. In the same capacities he went to Sondershausen, but remained only one year. In 1889-91 he filled the post of concert master in the Gewandhaus Orchestra of Leipzig, and in 1892 succeeded A. Brodsky as principal violin professor at the

conservatory, which position he retained until his death. He was not only one of the foremost virtuosos and quartet players, but also one of the most successful teachers of his instrument.

HILFERDING, hil'fer-ding, ALEXANDER FEDOROVITCH (1831-72). A Russian author, born at Moscow, of German stock. He studied in the city of his birth and after travels abroad devoted himself to historical and ethnographic studies. An ardent Panslavist, he wrote: *On the Servians and Bulgarians* (trans. into German by Schmalzer, 1856-64); a history of the Baltic Slavs (1855); a history of their struggle with Germany in the Middle Ages (1861); and the very unscientific discussions of the relation of the Slavic languages to Sanskrit and to the allied languages (1853). His greatest work is the collection of Russian popular songs, in the search for which he lost his life. The collection was edited by Hiltebrant (St. Petersburg, 1873). Hilferding's collected works were published in 1868-74.

HILFERDING, RUDOLF (?-). A German economist and Socialist. His writings, which deal mainly with the theories and tactics of scientific Socialism, were published largely in the *Mara Studien*, established in 1904 and edited by Hilferding and Max Adler. In this periodical appeared his "Böhm-Bawerks Marx Kritik" (1904) and "Das Finanzkapital, eine Studie über die jüngste Entwicklung des Kapitalismus" (1910).

HILGARD, EUGENE WOLDEMAR (1833-1916). A German-American agricultural chemist and geologist, born at Zweibrücken, Rhenish Bavaria. He came to America in 1836, but returned to study at Zurich, Freiberg, and Heidelberg (Ph.D., 1853). In 1858 he was appointed State geologist of Mississippi, which position he retained until 1872. He was professor of chemistry at the University of Mississippi from 1866 to 1873 and for the following two years was professor of geology and natural history in the University of Michigan. In 1875 he was made professor of agricultural chemistry and director of the agricultural experiment station at the University of California. In 1894 he received the Liebig medal for distinguished services to agriculture from the Munich Academy of Sciences. As a member of the Northern Transcontinental Survey, he devoted three years (1880-83) to a study of the agricultural capabilities of Oregon, Washington, and Montana. He retired from active service in the University of California and the experiment station in 1909, becoming professor emeritus. His investigations on the chemistry and physics of soil and the reclamation of alkali lands resulted in important contributions to agricultural science. Much of his work may be found recorded in the publications of the California Agricultural Experiment Station. He is the author of *Soils* (New York and London, 1906), *Alkali Lands, Irrigation, and Drainage in their Mutual Relations* (Sacramento, 1890); and joint author, with Osterhout, of *Agriculture for Schools of the Pacific Slope* (New York, 1910).

HILGARD, JULIUS ERASMUS (1825-91). An American engineer. He was born in Zweibrücken, Rhenish Bavaria, went to Illinois in 1835, studied engineering, and was employed in the Coast Survey service. During the Civil War he assisted the Northern army and navy by the construction of maps and charts and by surveys as well as by tidal and other information. He

was one of the members of the International Metric Commission at Paris in 1872 and was made a member of the permanent committee. In 1875 he was president of the American Association for the Advancement of Science and from 1881 to 1885 superintendent of the United States Coast Survey.

HILGARD, THEODORE CHARLES (1828-75). An American physician and scientist, born in Zweibrücken, Germany. He came to America in 1835 and began his professional work in St. Louis. He gave especial attention to microscopic studies of lower organic life until his health failed. Then he came to New York and engaged in the study of terrestrial physics with his brother Julius. His published works, besides papers appearing in the annals of various scientific societies, include: *Experimental Observations on Taste and Smell* (1854); *Exposition of Natural Series in the Vegetable Kingdom* (1858); *Phyllotaxis: Its Numeric and Divergent Law* (1859).

HILGENFELD, hil'gen-felt, ADOLF (1823-1907). An eminent German Protestant theologian, of the Tübingen school, born at Stappenbeck and educated at Berlin and Halle. In 1847 he became privatdocent, three years later professor, and in 1869 honorary professor, at Jena. Editor, after 1858, of the *Zeitschrift für wissenschaftliche Theologie*, he wrote: *Die Clementinischen Rekognitionen und Homilien* (1848); *Das Evangelium und die Briefe Johannis nach ihren Lehrbegriff* (1849); *Ueber die Evangelien Justins, etc.* (1850); *Das Markusevangelium* (1850); *Der Galaterbrief* (1852); *Das Urchristentum* (1855); *Die jüdische Apokalypstik* (1857); *Der Kanon und die Kritik des neuen Testaments* (1863); *Novum Testamentum extra Canonem Receptum* (2d ed., 1876-84); *Historisch-kritische Einleitung in das neue Testament* (1875); *Ketzergeschichte des Urchristentums* (1884); *Judentum und Judenchristentum* (1886); an edition of *Hermas's Pastor* (1887); *Acta Apostolorum Græce et Latine Secundum Antiquissimos Testes* (1899); *Ignatii Antiocheni et Polycarpi Smyrnæi Epistolæ et Martyria* (1902).

HILL, AARON (1685-c.1750). An eccentric English author, born in London. He treated in his verse many themes, from the creation of the world to doomsday. His activities were not limited to literature; in 1713 he took a patent for extracting oil from beech mast, and in 1718 he proposed a scheme for the colonization of Georgia. *Elfrid* (1710) is the earliest of eight dramatic pieces, either original or adapted. In conjunction with William Bond he edited an imitation of the *Spectator*, called the *Plain Dealer* (1724). His poems and letters were collected in 1753 and his plays in 1760. Consult D. Brewster, *Aaron Hill, Poet, Dramatist, Projector* (New York, 1913).

HILL, ABIGAIL. Favorite of Queen Anne of England. See MASHAM, ABIGAIL.

HILL, ALBERT ROSS (1869-). An American university president, born in Nova Scotia. He graduated from Dalhousie University in 1892 and from Cornell University (Ph.D.) in 1895; studied at Heidelberg, Berlin, Strassburg, and at Clark University; taught in Nova Scotia (1885-87); was professor of psychology and education at the State Normal School at Oshkosh, Wis., in 1895-97, and associate professor in 1897-98 and professor of philosophy and director of the psychological laboratories from 1898 to 1903 at the

University of Nebraska. He then became professor of educational psychology and dean of Teachers College at the University of Missouri, of which university he was appointed president (after one year at Cornell as professor of the philosophy of education, director of the School of Education, and dean of the College of Arts and Sciences). In 1904-05 he was president of the Western Philosophical Association.

HILL, AMBROSE POWELL (1825-65). An American soldier, prominent on the Confederate side in the Civil War. He was born in Culpeper Co., Va., graduated at West Point in 1847, and served in the United States artillery in the Mexican War, in Florida against the Seminoles in 1849-50, and on the Coast Survey, attaining the rank of captain, but resigned in March, 1861, to accept a commission as colonel in the Confederate service. At the battle of Beaver Dam Creek, June, 1862, his troops took part in the attack on the Federal position, and on the retreat of the latter to Gaines's Mill and New Cold Harbor pursued and again attacked them, only to be again repulsed. At Antietam, Sept. 17, 1862, he arrived just in time to stay the Federals, who were sweeping all before them, and so afforded Lee an opportunity to draw off his exhausted army. He commanded a division under Jackson at Fredericksburg, Dec. 13, 1862. At Chancellorsville, May 2-4, 1863, he commanded the reserve; and it was his troops who, on being moved to the front to take the place of the decimated regiments that had borne the brunt of the first day's fighting, mistook Jackson's escort for Federals and fired the fatal volley which caused Jackson's death. On May 10, 1863, General Lee reorganized his army, making three corps instead of two, and gave one corps to Hill, who at the same time was made a lieutenant general. This corps he led in the battle of Gettysburg and from the Wilderness until he met his death while reconnoitring at Petersburg, April 2, 1865.

HILL, BENJAMIN HARVEY (1823-82). An American legislator. He was born in Jasper Co., Ga., graduated at the State University in 1844, and within a year began the practice of law. In 1851 he was elected to the State Legislature as a Whig. He was a Unionist member of the State Secession Congress in 1861, but after striving vainly to prevent his State from seceding supported the movement. He was a member of the Provisional Confederate Congress the same year and was soon afterward chosen to the Confederate Senate. In 1865 he was for a short time a prisoner of war in New York. After the war he was an earnest Democrat and denounced the reconstruction acts of Congress, his *Notes on the Situation* (1867-68) attracting wide attention. He supported Horace Greeley for the presidency in 1872 and was defeated for the United States Senate in the following year. He became a member of the House of Representatives in 1875 and in 1876 was elected to the United States Senate, in which body he served until his death. A statue of him was erected in Atlanta in 1886. Consult H. Hill, Jr. (ed.), *The Life, Speeches, and Writings of Benjamin Harvey Hill* (Atlanta, 1891).

HILL, CHARLES SHATTUCK (1868-). An American editor. He was born at Fairfield, Vt., and graduated in civil engineering from the university of his native State in 1888. He was engaged in engineering work at Burlington, Vt., until 1888, and thereafter until 1906 served on

the editorial staff of the *Engineering News*. In 1906 he became editor of *Engineering and Contracting*. He is author of *The Chicago Main Drainage Canal* (1896); *Reinforced Concrete* (1904); *Concrete Construction* (1908); *Concrete Inspection* (1909); and he contributed to the *New International Encyclopedia*.

HILL, DANIEL HARVEY (1821-89). An American soldier in the Confederate service and an educator, born in York District, South Carolina. He graduated at West Point in 1842 and served in the Mexican War, for his gallantry in which he was brevetted major. He resigned in 1849 and became professor of mathematics in Washington College (now Washington and Lee University), Lexington, Va., and later filled a similar position in Davidson College, North Carolina. In 1859 he became superintendent of the North Carolina Military Institute, at Charlotte, but resigned in 1861 to enter the Confederate service. He commanded at the battle of Big Bethel, June 10, 1861, and was soon afterward promoted to be a brigadier general. He fought against McClellan in the Peninsular campaign and was especially conspicuous at the battle of Seven Pines and Fair Oaks, May 31 and June 1, 1862. He was with A. P. Hill at the battle of Beaver Dam Creek and participated in that of Gaines's Mill. At South Mountain, Sept. 14, 1862, with only 9000 men, he managed to hold the whole Federal army in check until Lee was able to get his trains and artillery out of danger, and then joined the main army in time to take part in the battle of Antietam on the 17th. He was appointed a lieutenant general by President Davis in July, 1863, and was placed in command of a corps in General Bragg's army, with which he fought at the battle of Chickamauga, Sept. 19-20, 1863. In the last year of the war he fought under Joseph E. Johnston at the battle of Bentonville, N. C., and laid down his arms at Durham Station on April 26, 1865. After the war he was for a number of years editor at Charlotte, N. C., of a monthly magazine entitled *The Land We Love* and later he edited *The Southern Home*. From 1877 until 1884 he was president of the Arkansas Industrial University and from 1885 until the year of his death of the Middle Georgia Military and Agricultural College. His publications include *Elements of Algebra* (1858), a number of religious tracts, and several articles in *Battles and Leaders of the Civil War* (Johnson and Buel, eds., New York, 1887).

HILL, DAVID BENNETT (1843-1910). An American politician. He was born at Havana, N. Y., Aug. 29, 1843, was admitted to the bar in 1864, and practiced law at Elmira, N. Y. He was a Democratic member of the New York Assembly in 1871 and 1872, and was elected mayor of Elmira in 1882. He early became prominent in State and national politics and was chairman of the Democratic State Convention in 1877 and again in 1881 and in the following year was elected Lieutenant Governor on the ticket with Grover Cleveland, upon whose resignation in 1885, preparatory to assuming the duties of the presidency, he became Governor. He continued to hold this position until 1891, when he succeeded William M. Evarts as a member of the United States Senate, where he took a prominent part in the debates, especially in those concerning the Wilson Tariff Bill in 1894. During his senatorial term he opposed various measures approved by President Cleveland and was instrumental in preventing the confirmation by the

Senate of the nominations of William B. Hornblower and Wheeler H. Peckham as justices of the United States Supreme Court. He was a prominent candidate for the presidential nomination before the Democratic National Convention of 1892; but the methods by which he had risen to political domination were becoming very unpopular, and in 1894 he was badly defeated for Governor of New York by Levi P. Morton. After the expiration of his term in the Senate (1897), Mr. Hill practiced law in Albany, though he continued to take an active part in politics. He died at Wolfert's Roost, his country home near Albany, Oct. 20, 1910.

HILL, DAVID JAYNE (1850-). An American diplomat and historian, born at Plainfield, N. J., and educated at Bucknell University (A.B., 1874; A.M., 1877), where he was professor of rhetoric in 1877-79 and then for eight years president. From 1888 to 1896 he was president of the University of Rochester. Subsequently he spent nearly three years in Europe in the study of public law and diplomacy, returning to this country to be Assistant Secretary of State (1898-1903). In 1903 Dr. Hill was appointed United States Minister to Switzerland and in 1905 Minister to the Netherlands, and from 1908 to 1911 he was Ambassador to Germany. In 1914 his candidacy for the Republican senatorial nomination (to succeed Elihu Root) received notable approval, but he was defeated at the direct primaries by James W. Wadsworth. During his residence in Washington he was professor of European diplomacy in the School of Comparative Jurisprudence, and he was a member of the Permanent Administrative Council of The Hague Tribunal. His writings include: *Science of Rhetoric* (1877; new ed., 1905); *Life of Washington Irving* (1879); *Life of William Cullen Bryant* (1879); *The Elements of Psychology* (1886); *The Social Influence of Christianity* (1888); *Genetic Philosophy* (1893); *The Conception and Realization of Neutrality* (1902); *The Contemporary Development of Diplomacy* (1904); *World Organization as Affected by the Nature of the Modern State* (1911; French and German trans.); and *A History of Diplomacy in the International Development of Europe* (1905-), of which three of six volumes had been published up to 1914.

HILL, FRANK PIERCE (1855-). An American librarian, born at Concord, N. H. Graduating from Dartmouth College in 1876, he served as librarian at Lowell, Mass., in 1881-85, started the first public library in New Jersey at Paterson in 1885 and also the Salem (Mass.) Public Library in 1888, and from 1889 to 1901 was librarian of the Newark Free Public Library. He then became librarian of the Brooklyn (N. Y.) Public Library. In 1906 he was president of the American Library Association. He compiled and edited *Lowell Illustrated* (1884).

HILL, GEORGE BIRKBECK (1835-1903). An English author, born at Tottenham, Middlesex, and educated at Pembroke College, Oxford. From 1859 to 1876 he was head master of the Bruce Castle School; in the latter year he resigned to devote himself to literature. He is best known as a Johnsonian scholar and editor. His numerous published works include: *Dr. Johnson: His Friends and his Critics* (1878); *Life of Sir Rowland Hill* (1880); *Colonel Gordon in Central Africa* (1881); *Wit and Wisdom of Dr. Johnson* (1888); *Footsteps of Samuel Johnson in Scot-*

land (1890); *Writers and Readers* (1892); *Harvard College, by an Oxonian* (1894); *Talks about Autographs* (1896); *Johnsonian Miscellanies* (1897); *Life of Edward Gibbon* (1900). He edited: *Boswell's Correspondence* (1879); *Boswell's Life of Johnson* (6 vols., 1887); *Rasselas* (1888); *Select Essays of Dr. Johnson* (1889); *Letters of Johnson* (1892); *Letters of Dante Gabriel Rossetti to William Allingham* (1897); *Unpublished Letters of Dean Swift* (1899); *Johnson's Lives of the English Poets* (1905). Volumes of his own *Letters* appeared in 1903 and 1906.

HILL, GEORGE WILLIAM (1838-1914). An American astronomer, born in New York and educated at Rutgers College. He became an assistant on the staff of the *American Ephemeris* and of the *Nautical Almanac* in 1861; was elected to the National Academy of Sciences in 1874; was a corresponding member of the Paris Academy of Sciences and of the Bavarian and Belgian Academies of Science, foreign member of the Royal Societies of London, Edinburgh, and Christiania, foreign associate of the Royal Astronomical Society, honorary member of the London Mathematical Society and the American Philosophical Society, and president (1894-96) of the American Mathematical Society. He was awarded a gold medal by the Royal Astronomical Society, London, in 1887, for his work on the lunar theory; and he received the Damoisian prize from the Paris Academy of Sciences in 1898. From 1898 to 1901 he lectured on celestial mechanics at Columbia University. He wrote largely on celestial mechanics and mathematics, and contributed to the governmental *Astronomical Papers* (especially 1882, 1890, 1891, 1895) and to the *Year Book of the Agricultural Department* (1898). His most valuable work is *A New Theory of Jupiter and Saturn* (1890). His *Collected Mathematical Works*, vols. i to iv, were published in 1905-07.

HILL, HENRY BARKER (1849-1903). An American chemist, son of Thomas Hill, president of Harvard (1862-68), and born at Waltham, Mass. He was educated at Harvard and the University of Berlin. He was assistant in the chemical laboratory at Harvard (1870), assistant professor (1874), full professor (1884), and director of the chemical laboratory (1894), and was elected to the National Academy of Sciences in 1883. He contributed to its *Proceedings* (1881 et seq.), to the *American Journal of Chemistry*, to *Silliman's American Journal*, and to the *Berichte der deutschen chemischen Gesellschaft* (vols. ix-xxxiii), and wrote *Notes on Qualitative Analysis* (1874).

HILL, JAMES J (EROME) (1838-1916). An American railway promoter. Born near Guelph, Ontario, of Scotch-Irish descent, he early left his father's farm for a business career in Minnesota. In 1870 he formed the Red River Transportation Company, which was the first to open communication between St. Paul and Winnipeg. Eight years afterward he helped to form the syndicate which under another name ultimately built the Canadian Pacific Railway. He secured control of the St. Paul and Pacific Railroad and, having reorganized it under the name of the St. Paul, Minneapolis, and Manitoba, was its general manager in 1879-81, vice president in 1881-82, and president from 1882 to 1890, when it became a part of the Great Northern System. The main line of the Great Northern—extending from Lake Superior to Puget Sound,

with northern and southern branches and a direct steamship connection with China and Japan—was built, with Hill as principal promoter, between 1888 and 1893. Of this road, or rather system of roads, he was president (1889-1907) and chairman of the board of directors (1907-12). He was also president of the original and the reorganized Northern Securities Company (see NORTHERN SECURITIES CASE), and a director in a number of railroad and other corporations; and he served as vice president of the New York Chamber of Commerce. He gave \$500,000 towards the establishment of a Roman Catholic theological seminary in St. Paul, Minn. In 1910 he published *Highways of Progress*. His collection of paintings of the modern French school is considered important.

HILL, JOHN FREMONT (1855-1912). An American capitalist and public official, born at Eliot, Me. He graduated from the Medical School of Maine (Bowdoin College) in 1877 and studied at the Long Island College Hospital Medical School, but practiced medicine only a year. In 1879 he became a member of the law firm (later a publishing house) of Vickery and Hill, and he was active in many railroad, steamship, telephone, and banking enterprises. He was best known as a Republican politician, serving as a member of the Maine House of Representatives in 1888-92, of the State Senate in 1892-96, and of the Executive Council in 1898-99; and he was Governor of Maine from 1901 to 1905. He was acting chairman in 1908-11, and chairman in 1911-12, of the Republican National Committee.

HILL, JOHN HENRY (1791-1892). An American educator, chiefly identified with teaching and missionary work in Greece. He was born in New York City, graduated at Columbia College, and was ordained a deacon in the Protestant Episcopal church in 1830. In the same year he went as a missionary to Greece, and at Athens he and his wife established a girls' school, afterward a school for boys, and also a high school for the training of teachers. His work at first received little encouragement, but prospered after pupils from prominent and wealthy Greek families began to attend the school. Dr. Hill was chaplain of the British Legation in Greece from 1845 to 1875 and continued his teaching during that time. On his death, at Athens, the Greek government, in recognition of his educational work among the women of Athens, buried him with the honors of a taxiarh, and the Athenian municipality erected a monument to his memory. After his death the school was conducted by his wife.

HILL, JOSEPH ADNA (1860-). An American statistician. Born at Stewartstown, N. H., he graduated from Harvard University in 1885 and from the University of Halle (Ph.D.) in 1892. He lectured at the University of Pennsylvania in 1893, was instructor at Harvard in 1895, and in 1897 investigated European systems of taxation, for the Massachusetts Tax Commission, publishing as a result *The English Income Tax with Special Reference to Administration and Method of Assessment* (1899). In 1898 he took up statistical work for the United States Census Bureau, of which he became chief statistician in 1909. In this connection he had charge of census reports on child labor, illiteracy, marriage and divorce, women at work, and a report for the Immigration Commission on occupations of immigrants. He was elected a

vice president of the American Statistical Association.

HILL, LEONARD (ERSKINE) (1866-). An English physiologist, son of George Birkbeck Hill. He was educated at Haileybury and at University College, London, where, after being demonstrator at Oxford, he became assistant professor of physiology. He was afterward Hunterian professor to the Royal College of Surgeons, Oliver Sharpey lecturer to the Royal College of Physicians, and professor of physiology, London Hospital. He made important studies of the circulation, of cerebral anæmia, caisson disease, arterial pressure, etc., and published: *The Physiology and Pathology of the Cerebral Circulation* (1896), *Manual of Human Physiology* (1899), *Physiology for Beginners* (1902), and, as editor, *Further Advances of Physiology* (1909), and a series of *International Medical Monographs*, in which his work *Caisson Disease* appeared in 1912.

HILL, LOUIS WARREN (1872-). An American railroad president, son of James J. Hill. He was born at St. Paul, Minn., and graduated from Yale University in 1893. After holding various positions on the Great Northern Railway and in connection with other railroad properties of his father, he succeeded the latter as president of the Great Northern System in 1907 and as chairman of the board of directors in 1912.

HILL, OCTAVIA (c.1836-1912). An English social reformer, born in London. At an early age she began her efforts to improve the homes of the London poor. She first began this work under Frederick D. Maurice and later, in 1864, was associated with John Ruskin. The latter advanced the money for purchasing the houses and improving them or erecting new ones. She taught multitudes to help themselves, impressing upon them ideas of cleanliness, order, and self-respect. She was a member of the Royal Commission on the Poor Laws in 1905. Her publications include: *Homes of the London Poor* (1875) and *Our Common Land* (1877). Consult *Life of Octavia Hill as Told in her Letters*, edited by C. Edmund Maurice (London, 1913).

HILL, ROBERT THOMAS (1858-). An American geologist, who became connected with the United States Geological Survey in 1886. He was born at Nashville, Tenn., and in 1886 graduated at Cornell University. During his explorations on the southern borders of the United States and Mexico and in Central America and the West Indies, he demonstrated the existence of the Lower Cretaceous formations in the United States and proved that artesian wells might be procured over a vast area of Texas. For two years he was professor of geology at the University of Texas. He was prominently connected with the Martinique expeditions of 1902. Besides bulletins and governmental reports, he is author of *On Occurrence of Artesian and Underground Waters in Texas, Eastern New Mexico, and Indian Territory* (1892), and of *Cuba and Porto Rico, with Other Islands of the West Indies* (1898), his chief work.

HILL, ROWLAND (1744-1833). An English preacher of great popularity. His father was a baronet, and he was born at Hawkstone Park, Shropshire, on the border of Wales, Aug. 23, 1744. He graduated B.A. at Cambridge in 1769, and while there made the acquaintance of Whitefield, preached in the surrounding villages before taking orders, and conducted religious serv-

ices in the houses of the sick and poor. He was appointed in 1773 to the parish of Kingston, Somersetshire, where he preached in the open air and attracted great crowds to the services which he held nearly every day of the week. Having, on the death of his father in 1780, inherited considerable property, he built for his own use Surrey Chapel, on the Blackfriars Road, London. The chapel was opened June 8, 1783. Although he now occupied a position as a dissenting minister, yet he remained a member of the Church of England and used its liturgy in Surrey Chapel. His chapel soon became filled with a larger congregation than any other in London. In the summer months he made what he called "gospel tours" into all parts of the country, sometimes extending them to Scotland and Ireland, attracting, wherever he went, crowded and interested audiences. After these tours he used to return to his duties at the Surrey Chapel, where he continued to officiate to the end of his life. He published accounts of two journeys through England and Scotland (1799 and 1800); a very popular hymn book (1783); numerous sermons, but especially *Village Dialogues* (1801; 34th ed., 1839). He was among the founders of the Religious Tract Society and the British and Foreign Bible Society, an early and courageous defender of vaccination, and himself vaccinated thousands of persons. He wrote in favor of the practice, *Cow-pock Inoculation Vindicated and Recommended from Matters of Fact* (London, 1806). He died in London, April 11, 1833. His life has been written several times—by Sidney (4th ed., London, 1844), Sherman (ib., 1857), Charlesworth (ib., 1879).

HILL, ROWLAND, VISCOUNT (1772-1842). An English soldier, nephew of the preacher of the same name, born at Prees, Shropshire, Aug. 11, 1772. He entered the army when he was 15 and studied a year at Strassburg. He served under Abercromby in Egypt (1801) and accompanied Wellesley to Portugal in 1808. Throughout the Peninsular War he showed ability second only to his chiefs. In 1811 he utterly defeated the French army at Cáceres, and in 1812 he took the fortress of Almaraz, thus separating the two French armies. At Vitoria, in 1813, his forces made the initial attack, and in the same year, on the Nive, he again defeated the French. He had been promoted to lieutenant general in 1812; two years later he was created Baron Hill of Almaraz and Hawkstone and received an annual grant from Parliament of £2000. During the Hundred Days he was no less active and prominent. After a diplomatic errand to the Prince of Orange he commanded a division in the allied army. His horse was shot under him at Waterloo, and he was so stunned that in the thick of the fight he was for some time lost and supposed to have been killed. Hill remained with the army of occupation in France as second in command. He was promoted general in 1825, and three years later succeeded Wellington as commander in chief; but in 1842 he resigned because of failing health and turned over the command to Wellington. He became Viscount in the same year, a few months before his death, Dec. 10, 1842. Consult Sidney, *The Life of Lord Hill* (London, 1845), and Shand, *Wellington's Lieutenants* (ib., 1902).

HILL, SIR ROWLAND (1795-1879). The reformer of the English postal system. At 12 he became a teacher in his father's school at Birmingham, and before he reached his majority

he had organized a remarkable system of discipline which came to be known as the Hazelwood method (from the name of the school). This system was described by his elder brother, Matthew Davenport Hill, in a pamphlet entitled *Public Education: Plans for the Government and Liberal Instruction of Boys in Large Numbers* (1822). The school became widely popular and was carried on with success by the family. Rowland finally withdrew, however, partly because he recognized the defects of his scholarship and partly because he was oppressed by the religious observances required. He thought of joining Robert Owen in his communistic schemes, but in 1833 became secretary of the commission for colonizing South Australia. From childhood he had a strong bent towards invention. About this time he devised a successful rotary printing press; but it was not then adopted, because the Treasury demanded that each single sheet for a newspaper should be previously stamped and forbade the attaching of the stamps by machinery. But his great work was that of securing the adoption of penny postage. The franking privilege was widely used by members of Parliament and high officials for themselves and their friends. The great body of the people, however, sent few letters, and postage on them had to support the whole service. Rates depended upon distance, and as they were rarely prepaid, to receive a letter was often a hardship. Under this system rates of postage were advancing and postal revenues diminishing. After making a careful study of the statistics, in 1837 Hill published a pamphlet, *Post-Office Reform*, in which he recommended a penny rate for half-ounce letters, regardless of distance, inside the United Kingdom, and the use of adhesive stamps. His plan was adopted, and in 1840 he was given an appointment in the Treasury, where against great opposition he was working out the system when he was dismissed by a change of ministry. In 1846 a fund of £13,000 was raised by public subscription for him. The same year the Whigs again came into office, and he was made Secretary to the Postmaster-General and in 1854 Chief Secretary. In 1864 he retired on full salary and received a parliamentary grant of £20,000. He wrote a *History of Penny Postage*. This was published in 1880, with an introductory memoir by his nephew, Dr. G. Birkbeck Hill. Consult E. C. H. Smyth, *Sir Rowland Hill: The Story of a Great Reform* (London, 1907).

HILL, THOMAS (1818-91). An American educator and Unitarian clergyman, born in New Brunswick, N. J., of English parentage. He was left an orphan when about 10 years old and in 1830 was apprenticed to a printer for a term of three years. He spent the year 1834-35 at the Lower Dublin Academy, near Philadelphia, where his eldest brother was principal, and then apprenticed himself to an apothecary in New Brunswick. In 1839 he decided to go to college and entered Harvard the following year in the class of 1843. His preëminence in mathematics won him an offer of a high position at the National Observatory in Washington; but he intended to go into the ministry and, contrary to the advice of his professors, entered the divinity school, from which he graduated in 1845. For the next 14 years he was pastor of the Unitarian Church in Waltham, Mass. In 1859 he succeeded Horace Mann as president of Antioch College. Although the college was in such financial straits that he was obliged to supplement his salary by preach-

ing in Cincinnati, 70 miles distant, he continued his services until elected president of Harvard in 1862. Failing health compelled him to resign this position in 1868. In 1871 he was elected to the Massachusetts Legislature. In the same year he went to South America with Louis Agassiz. On his return he accepted a call to the First Parish Church in Portland, Me. He was a man of unusual versatility and gained distinction in many of the pursuits in which he interested himself. He was one of the foremost natural scientists of the time and an accomplished classical scholar as well as a mathematician. He invented several mathematical machines, among which his occulator is of the most importance, and made valuable contributions to the knowledge of curves in simplifying their expression and in discovering new forms. Besides publishing essays, textbooks, and volumes of sermons, he edited Eberty's *Stars and the Earth* (1849) and wrote *Christmas and Poems on Slavery* (1843); *Geometry and Faith* (1849); *Curvature* (1850); *Liberal Education* (1855); *True Order of Studies* (1859); *Jesus the Interpreter of Nature, and Other Sermons* (1870); *Statement of the Natural Sources of Theology, with Discussion of their Validity, and of Modern Skeptical Objections* (1877); *In the Woods and Elsewhere* (1888), verse.

HILL, THOMAS (1829-1908). An American landscape painter, born in Birmingham, England. After 1861 he lived most of his life in San Francisco, having come to America in 1840. He studied in Philadelphia at the Pennsylvania Academy and in Paris under Paul Meyerheim. Among his paintings are "Yosemite Valley," "White Mountain Notch," "The Home of the Eagle," "Donner Lake," "Grand Cañon of the Sierras," "Muir Glacier." His exhibit at the Centennial Exhibition was well received, but had the faults common to most American landscape painters of the period.

HILL, WILLS. See HILLSBOROUGH, EARL OF.

HILL/DAH. The capital of a sanjak in the Vilayet of Bagdad, Asiatic Turkey, situated on the Euphrates, 60 miles south of Bagdad. It is not far from the ruins of Babylon, from which most of its building material has been taken (Map: Turkey in Asia, E 4). It is poorly built, has a large number of mosques, and is a stopping place for pilgrim caravans on the way to the holy cities of Meshhed-Ali and Meshhed-Hussein. It has manufactures of cotton goods and woolen mantles and a number of good bazars. The cultivation of the palm is the chief occupation of the surrounding country. Pop. (est.), about 20,000, largely Arabs and Jews.

HILLARD, GEORGE STILLMAN (1808-79). An American lawyer and author. He was born in Machias, Me., graduated at Harvard in 1828, studied law and acquired an extensive legal practice in Boston. He also served in the State Legislature and from 1866 to 1870 was United States district attorney for Massachusetts. At earlier periods he collaborated with George Ripley in editing the *Christian Register*, a Unitarian paper, and with Charles Sumner in publishing the *Jurist*. In 1856 he bought an interest in the Boston *Courier* and was for some time associated in its editorial management. Among his numerous works are: *Six Months in Italy* (1853); *Life and Campaigns of George B. McClellan* (1864); and, with Mrs. Ticknor, a *Life of George Ticknor* (1873). He also edited *The*

Poetical Works of Edmund Spenser (5 vols., 1839).

HILLEBRAND, hil'e-bränt, JOSEPH (1788-1871). A German philosopher and historian of literature, born at Grossdünken, near Hildesheim. He was originally a Catholic, studied at Hildesheim and at Göttingen, and in 1815 entered the priesthood and taught at Hildesheim, but resigned his position on accepting Protestant views. Upon Hegel's departure from Heidelberg in 1818 he was appointed professor of philosophy there and in 1822 took a like position at Giessen. He was President of the Lower House of the Hessian Chamber in 1848, but retired in 1850. His most important work is *Die deutsche Nationalität seit dem Anfang des 18. Jahrhunderts* (3d ed., 1875). Of less importance are his philosophical works, which show tendencies towards the views of Jacobi: *Die Anthropologie als Wissenschaft* (1822-23); *Lehrbuch der theoretischen Philosophie und philosophischen Propädeutik* (1826); *Litterarästhetik* (1826); *Universalphilosophische Prolegomena* (1830); *Der Organismus der philosophischen Idee* (1842); *Philosophie des Geistes* (1835).

HILLEBRAND, KARL (1829-84). A German historian and publicist, son of Joseph Hillebrand. He was born in Giessen and studied law there and at Heidelberg. He was imprisoned for participation in the insurrection at Baden in 1849, but escaped to France and completed his studies at Bordeaux and the Sorbonne. He next taught German at the Military Academy at Saint-Cyr and in 1863 was appointed professor of foreign literature at Douai. At the outbreak of the Franco-German War he went to Italy as correspondent of the *London Times* and settled at Florence. He contributed numerous articles to French, English, Italian, and German periodicals and published many separate works, including the prize essay *Des conditions de la bonne comédie* (1863); *La Prusse contemporaine et ses institutions* (1867); *Zeiten, Völker und Menschen: Gesammelte Aufsätze* (1874-85); *Geschichte Frankreichs von der Thronbesteigung Ludwig Philipps bis zum Fall Napoleons III.* (1877-79); *Lectures on German Thought during the Last Two Hundred Years* (1880). Consult Homberger, *Karl Hillebrand* (Berlin, 1884).

HILLEBRAND, WILLIAM FRANCIS (1853-). An American chemist. He was born at Honolulu, Hawaiian Islands, attended Cornell University (1870-72), graduated from the University of Heidelberg (Ph.D., 1875), and studied at the University of Strassburg and at the Mining Academy of Freiberg, Saxony. He was an assayer at Leadville, Colo., in 1879-80, served as chemist of the United States Geological Survey from 1880 to 1908, and thereafter was chief chemist of the Bureau of Standards, Washington. From 1892 to 1910 he held the professorship of general chemistry and physics at the National College of Pharmacy. In 1906 he was president of the American Chemical Society. In 1908 he became editor of the *Journal of Industrial and Engineering Chemistry*, and he is author of *Some Principles and Methods of Rock Analysis* (1900; 2d ed., 1902) and *The Analysis of Silicate and Carbonate Rocks* (1907; 2d ed., 1910).

HILLEBRANDT, hil'e-bränt, ALFRED (1853-). A German Sanskrit scholar, born at Grossnütz. He studied at Breslau and Munich and became professor in the former university. His especial branch of study is Vedic

mythology. *Varuna und Mitra* (1877) was a prologue to his great work *Vedische Mythologie* (1891-1902, 1910). Hillebrandt also wrote: *Das altindische Neu- und Vollmondsopfer* (1880); *Vedachrestomathie* (1885); a section on religious antiquities in Bühler's *Grundriss der indoarischen Philologie und Altertumskunde* (1897); *Alt-Indien, kulturgeschichtliche Skizzen* (1899); an edition of Visakhadatta's *Mudrarāksa* (1912); *Die Lieder des Rigveda* (1913).

HILLEL, called HA-BABLI (the Babylonian), or HA-ZAKEN (the elder). A Jewish rabbi who died a few years after the beginning of the Christian era. By birth a Babylonian, he left his home and went to Jerusalem to study the law. By doing manual labor he was enabled to support himself while attending the lectures of Shemayah and Abtalion, the president and vice president respectively of the Sanhedrin. His progress was rapid. His solution of a difficulty which arose concerning the lawfulness of slaughtering the paschal lamb on the Sabbath led to his being appointed president of the Sanhedrin (30 B.C.), and he held this position till about 10 A.D. Hillel's character was gentle, patient, and peace-loving. It is Hillel to whom is ascribed the maxim, "What is hateful unto thee do not unto others." He plays an important part in the history of Jewish legal science. He introduced a set of seven rules by which the Scriptures are to be interpreted and laws derived from them. Entirely the opposite of Hillel in character was Shammai (q.v.), the vice president of the Sanhedrin. His teaching was marked by a strict adherence to the letter and great vigor. The difference between the leaders was continued by their followers, so that, years afterward, we still encounter the school of Hillel and the school of Shammai. The honor and respect won by Hillel were so great that his position of president of the Sanhedrin remained in his family.—**HILLEL HA-NASI** (the prince). A descendant of the preceding, who lived about 350 A.D. He was also president of the Sanhedrin and had charge of the school at Tiberias. His great work was the arranging of the Hebrew calendar. In this he followed the system instituted by Meton.

HILLER, FERDINAND (1811-85). An eminent German pianist, conductor, and composer, born at Frankfurt. From early boyhood he was a student of music, his concert début taking place at 10 years of age, followed two years later by the production of his first composition. His first teachers were Hofmann for the violin, Aloys Schmitt for the pianoforte, and Vollweiler for harmony and counterpoint. Later (1825) he became a pupil of Hummel at Weimar. For seven years (1828-35) he was engaged as teacher of composition at Choron's School of Music, Paris, but eventually gave up his position, returned to Frankfurt the following year (1836), and devoted himself to composition. His abilities were recognized and attracted the notice of Rossini and Mendelssohn, the former assisting him to launch his first opera, *Romilda* (which was a failure), at Milan, and the latter obtaining for him the entrée to the Gewandhaus and affording an opportunity for the public presentation of his oratorio *Die Zerstörung Jerusalems* (1840). After a year of study in Church music at Rome he returned to Leipzig and during the season of 1843-44 conducted the Gewandhaus concerts. By this time his position in the musical world was established, and honors and appointments were showered upon him. He became

municipal kapellmeister of Düsseldorf in 1847 and in 1850 received a similar appointment at Cologne, in which latter city he founded the well-known Cologne Conservatory. He was conductor at the Italian Opera in Paris during the season of 1852-53. Meanwhile he had increased his reputation and prestige by his conductorship of the Gürzenich concerts and the Lower Rhine music festivals. His compositions include six operas, six cantatas, and pieces in every form and variety of composition. He was also a very successful lecturer and a forceful writer, his contributions to reviews and newspapers having been since collected in book form. He also published among others: *Musikalisches und Personliches* (1876); *Wie hören wir Musik?* (1880); *Goethes musikalisches Leben* (1880); *Erinnerungsblätter* (1884). He died at Cologne.

HILLER, JOHANN ADAM (1728-1804). An important German dramatic composer, born at Windisch-Ossig, near Görlitz. He was of musical parentage and was endowed with a fine soprano voice, which obtained for him a course of free instruction at the Görlitz Gymnasium, from which he went to the Kreuzschule at Dresden, where he became a pupil of Homilius for pianoforte and thorough bass. Later he went to Leipzig for study at the university, and while there earned a bare existence as flutist and singer in local concerts and by private teaching. His first good fortune came with his appointment as tutor to the son of Count Brühl at Dresden, with whom he went in 1758 to Leipzig. It was during his stay here at this time that he conceived the idea of reviving the old subscription concerts, an attempt which ultimately led to the founding of the famous Gewandhaus concerts, of which he was the first conductor. From 1789 to 1801 he was music director of the Thomasschule. He also founded a singing school in 1771. To him has been given the credit of being the originator of the *Singspiel*, the beginning of German comedy opera as distinct from the French and Italian developments. The most important of these were: *Lottchen am Hofe* (1760); *Der Teufel ist los* (1768); *Politis, oder Das gerettete Troja* (1782). The lyrics of all his *Singspiele* were of considerable musical value and have been long popular. Among his sacred compositions are *A Passion Cantata*, *Funeral Music in Honor of Hasse*, the *One Hundredth Psalm*, and a few symphonies. He also edited many important collections of music and wrote considerably concerning musical topics. He was one of the most important German musical scholars and writers of the eighteenth century. His *Wöchentliche Nachrichten und Anmerkungen* (1766-70) is the oldest musical periodical. He died at Leipzig. Consult K. Peiser, *Joh. Ad. Hiller* (Leipzig, 1895).

HILLERN, WILHELMINE VON (1836-). A German novelist, born at Munich, daughter of the popular dramatist Charlotte Birch-Pfeiffer. She is best remembered for her satire of blue-stockings in *Der Arzt der Seele* (1869) and for a charming tale of Freiburg-im-Breisgau in Reformation days, *Höher als die Kirche* (1871). Worthy of mention also are *Die Geier-Wally* (1873), cleverly dramatized by her in 1881, the historical novel *Und sie kommt doch* (1878), and the Black Forest sketches *Ein Blick ins Weite* (1897). Among her later works are *Der Gewaltigste* (1899), *Ein Sklave der Freiheit* (1903), and some comedies.

HILLER VON GÄRTRINGEN, hil'ér fön gërt'ring-en, FRIEDRICH, BARON (1864-). A German classical archaeologist, born in Berlin and educated at the universities of Tübingen, Berlin, and Göttingen. Between 1890 and 1910 he undertook 11 important archaeological expeditions in Greece, Italy, and Turkey, working after 1892 on Greek inscriptions for the Royal Prussian Academy of Science and publishing in 1895, 1898, 1903, 1904, 1909, and 1913 volumes of the *Inscriptiones Græcæ*. In 1896-1902 he had charge of excavations at Thera; and he published: *Die archaische Kultur der Insel Thera* (1897); *Thera, Untersuchungen, Vermessungen, und Ausgrabungen* (1899-1904); with others, *Arkadische Studien* (1911).

HILLES, hil'ës, CHARLES DEWEY (1867-). An American politician, born in Belmont Co., Ohio. From 1890 to 1902 he was financial officer and superintendent of the Boys' Industrial School of Ohio, and from then until 1909 he was superintendent of the New York Juvenile Asylum at Dobbs Ferry, N. Y., of which he later became president. In 1909 he was appointed Assistant Secretary of the United States Treasury; but he resigned from that office in 1911 to become secretary to President Taft for the remainder of the presidential term. In 1912 he was chosen chairman of the Republican National Committee. He became a stockholder and one of the resident managers of the Employers' Liability Assurance Corporation of New York in 1913.

HILL FORTS. Defensive positions on hills. The customs of early groups of people as to defensive locations for residence on elevations have determined the foundation of many of the most famous cities. Hill forts of various periods from the most ancient are common throughout the world and refer to the monuments and settlements of small groups of men, both securing them from attack and forming a base for industrial occupations and forays. Rome, Athens, and Jerusalem were such hill forts. Settlements on plains or shores represent either times or localities of greater security or the weight of large bodies of men discounting attack, and they supply the means of building great artificial fortifications. The history of nearly every nation gives evidence of this period, and these forts are still found among the more primitive tribes, especially in India.

HILL/HOUSE, JAMES (1754-1832). An American legislator, born at Montville, Conn. After graduating at Yale in 1773, he practiced law in New Haven. He took an active part in the War of the Revolution and, when New Haven was attacked by the English under Tryon in 1779, was captain of the Governor's Guards. He became a Federalist member of Congress in 1791 and from 1795 to 1810 was a member of the United States Senate. In 1815 he was a member of the Hartford Convention. That New Haven is known as the Elm City is largely due to Senator Hillhouse, who set out with his own hands many of these trees.

HILLHOUSE, JAMES ABRAHAM (1789-1841). An American poet. He was born in New Haven, Conn., the son of Senator James Hillhouse, graduated at Yale in 1808, and for some time was engaged in business in New York City. After 1822 he devoted himself almost wholly to literature. His chief works are *The Judgment: A Vision* (1812) and the dramas *Percy's Masque*

(1820) and *Hadad* (1825). An edition of his works was published in two volumes in 1839. His heavy, ambitious dramas were once highly praised.

HILLIARD, hil'yard, FRANCIS (1806-78). An American jurist, born in Cambridge, Mass. He graduated at the Harvard Law School in 1823, practiced law in Boston, and served for a time as judge, but is known principally as a writer of legal textbooks. His best-known works are: *American Law of Real Property* (2d ed., 1846); *American Jurisprudence* (2d ed., 1848); *Law of Mortgages of Real and Personal Property* (1853); *Treatise on Torts* (1859); *The Law of Injunctions* (1864).

HILLIARD, HENRY WASHINGTON (1808-92). An American lawyer, born in Fayetteville, N. C. He graduated in 1826 at South Carolina College, removed to Athens, Ga., and was admitted to the bar in 1829. From 1831 to 1834 he was a professor in the Alabama University, Tuscaloosa, and in 1838 was elected to the State Legislature. In 1842-44 he was chargé d'affaires in Belgium and from 1845 to 1851 was a member of Congress from Alabama. He opposed the secession of the South, but subsequently accepted the posts of commissioner to Tennessee and brigadier general in the provisional Confederate army. From 1877 to 1881 he was United States Minister to Brazil. He published: *Roman Nights* (1848), from the Italian; *Speeches and Addresses* (1855); *De Vane* (1865).

HILLIARD, NICHOLAS (1537-1619). The first great English miniature painter. He was born in Exeter, the son of Richard Hilliard, afterward high sheriff of the city and county. He was goldsmith, carver, and portrait painter to Queen Elizabeth, and "royal enamel painter and embosser of his gold medals" to James I. His model was Holbein, as he himself says in the important treatise on miniature painting preserved in the Bodleian Library; but his work, compared with that of his master, lacks body and tone. He excels, however, in delicacy and in decorative value, and takes every advantage of the stiff Elizabethan collar and ruff, the embroidered bodices, and the jeweled head-dresses. Hilliard is best known by his numerous portraits of Queen Elizabeth, of which there are two fine specimens in the Montague House collection. His portrait of James I in its contemporary diamond setting was sold at the Hamilton sale for £2855. In the J. Pierpont Morgan collection of miniatures, loaned to the Metropolitan Museum, New York, are 20 portraits by, or attributed to, Nicholas Hilliard—among them one of Elizabeth before her accession to the throne; Mary, Queen of Scots; Lord Darnley; Henry, Prince of Wales, the eldest son of James I. Consult: Horace Walpole, *Anecdotes of Painting*, vol. i (London, 1849); *Catalogue of Exhibition of Portrait Miniatures in Burlington Fine Arts Club* (ib., 1889); G. C. Williamson, *Illustrated Catalogue of the J. P. Morgan Collection* (ib., 1906-07).

HILLIS, NEWELL DWIGHT (1858-). An American Congregational clergyman and writer, born at Magnolia, Iowa. He graduated from Lake Forest University in 1884 and from McCormick Theological Seminary in 1887. Ordained to the Presbyterian ministry in 1887, he was pastor at Peoria and Evanston, Ill., until 1895, of the Central (Independent) Church, Chicago (1895-99), and of Plymouth Congregational

Church, Brooklyn, after 1899. He became widely known as a speaker and writer, some of his books being: *A Man's Value to Society* (1896); *Great Books as Life Teachers* (1899); *Influence of Christ in Modern Life* (1900); *Success through Self-Help* (1903); *The Fortune of the Republic* (1906); *Contagion of Character* (1911); *Prophets of a New Era* (1912); *Lectures and Orations of Henry Ward Beecher* (1913); *The Story of Phœdrus* (1914).

HILL MUSTARD. See BUNIAS.

HILL MY'NA (hill + myna, from Hindi *mainū*, starling). The common name, in India, of the grackles of the family Eulabetidae. These starling-like birds belong to the group called glossy starlings, and especially to the genus *Eulabates*. They are birds of moderate size and glossy-black plumage, marked by fleshy yellow or orange wattles on the head. The shortness and squareness of the tail are noticeable. The best-known species is that of southern India and Ceylon (*Eulabes religiosa*), which is distinguished from the others by two long patches of bare skin on the neck, also by a white spot at the base of the wing quills. They live in the forest and feed on small fruits. They are excellent mimics, learn easily to whistle and talk, and are not only highly prized as cage birds in India, but are exported in large numbers. Other species are known in northern India and eastward. See MYNA.

HILL PARTRIDGE, or TREE PARTRIDGE. One of a numerous group of partridges (genus *Arboricola*) which frequent elevated forested regions from the Himalayas eastward to Formosa. They are mostly of very dark colors. The plumage is alike in both sexes, and the eggs are pure white. They frequently alight on trees when flushed by dogs, but live upon the ground like other partridges. They are favorite game birds in northern India.

HILL/QUIT, MORRIS (1869-). An American Socialist. He was born at Riga, Russia, attended the Gymnasium of his native city in 1881-86, and, having emigrated with his parents to the United States in 1886, he graduated in 1893 from the New York University Law School. After joining the Socialist party in 1888, his ability as a speaker and debater quickly gained him prominence in that organization, and as a delegate to various national conventions he played an important part in shaping the party policies. He served as National Committeeman from New York in 1902-06 and as a member of the National Executive Committee of the party after 1907, was delegate to several international Socialist congresses, and in 1904 was appointed a representative on the International Socialist Bureau at Brussels, Belgium. His writings on Socialism, considered authoritative, include: *History of Socialism in the United States* (1903; 5th ed., 1910); *Socialism in Theory and Practice* (1909); *Socialism Summed Up* (1912; 2d ed., 1913); and a series of debates with Rev. John Augustine Ryan, *Socialism—Promise or Menace?* (1914).

HILLSBORO, hîlz'bûr-ô. A seaport town of Albert Co., New Brunswick, Canada, on the right bank of the Petitcodiac estuary, just above its outlet into Shepody Bay, 24 miles from Salisbury, 15 miles southeast of Moncton, on the Salisbury and Albert Railway (Map: New Brunswick, E 3). It has manufactures of plaster, which, with mineral oil from the depleted "albertite" coal mines in the neighbor-

hood, it exports in considerable quantities to the United States. Other manufacturing establishments are carriage factories, flour mills, a woodworking factory, and railway machine shops. There is an annual output of 120,000 tons of gypsum from mines in the vicinity. The town was founded in 1763 by a member of the Steeves family, whose descendants number a large part of the total population. Pop., 1914 (local est.), 1250.

HILLSBORO, hîlz'bûr-ô. A city and the county seat of Montgomery Co., Ill., 58 miles northeast of St. Louis, Mo., on the Chicago and Eastern Illinois, the Cleveland, Cincinnati, Chicago, and St. Louis, and the Illinois Traction railroads (Map: Illinois, F 7). It has coal mines, a glass-jar factory, zinc and lead smelters, a milk condensary, and a brickyard. There are municipal water works and a Carnegie library. Hillsboro adopted the commission form of government in 1911. Pop., 1900, 1937; 1910, 3424.

HILLSBORO. A city and the county seat of Orange Co., N. C., 40 miles northwest of Raleigh, on the Southern Railway (Map: North Carolina, C 1). It is one of the oldest cities in the State. Situated on the Eno River, at the foot of a low range of mountains, Hillsboro is surrounded by beautiful natural scenery. The chief industries are general farming, tobacco raising, the manufacture of cotton goods. The city contains a public library and a courthouse, and a town clock presented to Hillsboro by King George III of England. Pop., 1900, 707; 1910, 857.

HILLSBORO. A village and the county seat of Highland Co., Ohio, 59 miles by rail east of Cincinnati, on the Baltimore and Ohio Southwestern and the Norfolk and Western railroads (Map: Ohio, C 7). It has a public library, county hospital, and a fine soldiers' monument of granite. There are cane, feed, and grinding mills, and manufactures of lumber, furniture, flour, foundry products, safes and vaults, chairs, overalls, etc. The village owns its water works. Pop., 1900, 4535; 1910, 4296.

HILLSBORO. A city and the county seat of Hill Co., Tex., 34 miles north of Waco, on the Missouri, Kansas, and Texas, the St. Louis Southwestern, and the Trinity and Brazos Valley railroads (Map: Texas, D 3). It is the centre of a fertile agricultural district, with an important trade in cotton, grain, and live stock, and has cotton gins and compresses, a cotton mill, a cottonseed-oil mill, a creamery, flour and planing mills, and manufactures of advertising novelties, candy, hay presses, etc. Hillsboro is governed by a mayor and four aldermen. The water works and sewage system are owned by the city. Pop., 1900, 5346; 1910, 6115.

HILLSBOROUGH, hîlz'bûr-ô, WILLS HILL, EARL OF (1718-93). A British statesman, first Marquis of Downshire, a native of Fairford, Gloucestershire. He was elected to Parliament for Warwick in 1741 and the following year succeeded his father as Lord Lieutenant of Downshire. He became a peer of Ireland in 1751, but went from the Irish to the English Privy Council (1754), George II having made him comptroller of his household. After entering the English House of Lords (1756) as Baron Harwich, he held various political appointments. While Secretary of State for the Colonies (1768), his stubbornness and bad judgment contributed much to the ill feeling between them

and the mother country, and he showed little tact in advocating the union of England and Ireland.

HILLSDALE. A city and the county seat of Hillsdale Co., Mich., 65 miles south of Lansing, on the Lake Shore and Michigan Southern Railroad (Map: Michigan, E 7). It is the centre of a fertile dairying and stock-raising region and manufactures fur and fur-lined overcoats, flour, window screens and screen doors, shoes, gas engines, wagons, wagon wheels, condensed milk, etc. The city has a public library, fine Federal and city hall buildings, a beautiful private park, and south of the city limits is Baw Beese Park, a popular summer resort. Hillsdale College (q.v.) was established here in 1855. Hillsdale, settled about 1840, is governed under a charter of 1896, by a mayor, elected annually, and a unicameral council, of which the executive is a member. The water works and electric-light plant are owned by the city. Pop., 1900, 4151; 1910, 5001.

HILLSDALE COLLEGE. A coeducational institution for higher education at Hillsdale, Mich. It was founded at Spring Arbor, Mich., in 1844 as the Michigan Central College. In 1853 the institution was removed to Hillsdale and reorganized as Hillsdale College. It was open for students in 1855. The departments of the college include the liberal arts, or collegiate; preparatory, eleventh and twelfth grades; Christian workers; music, instrumental and vocal; fine arts; oratory and expression; household economics; and business. The total attendance in all departments in 1913-14 was 475, of whom 272 were women and 203 were men. In the collegiate department were 131 women and 145 men. The faculty numbered about 25 members. The library contains about 30,000 volumes. The productive funds of the college amount to about \$275,000, and the annual income to about \$30,000. The president in 1914 was Joseph William Mauck, A.M., LL.D.

HILL STAR. Any humming bird of the genera *Diplogena* and *Oreotrochilus*. These are among the largest of the tribe, very gay in color, and inhabit the Andes from Ecuador to Bolivia. Those of the former genus are remarkable for their brilliant crown spots. In the latter genus are many species, each of which is limited in its range to a single mountain or very limited area of high elevation. See HUMMING BIRD.

HILL TIT. One of a numerous subfamily (Liotrichinæ) of small insect and berry eating birds, often brightly colored, which inhabit the Himalayan region and eastward. Among them is the red-billed hill tit (*Liothrix luteus*). It has brilliant colors, a sweet song, and gentle manners.

HILL-TOUT, CHARLES (1858-). A Canadian educator and ethnologist. He was born in England and was educated by private tutors and at Lincoln and studied for the ministry of the Church of England; but later he went to British Columbia and entered educational work. He was for some time principal of Buckland College, Vancouver, and later was appointed organizing secretary of the Ethnological Survey of Canada. In 1903 the Royal Society of London, England, awarded him funds to aid him in his ethnological studies among the native races of British Columbia. In 1913 he was elected a fellow of the Royal Society of Canada. Among his papers contributed to the

Transactions of the Royal Society of Canada are: "Later Prehistoric Man in British Columbia," "The Oceanic Affinities of the Kwakiuth-Salish Tribes of British Columbia," and "Origin of Totemism of the Native Races of British Columbia." He published also *The Native Races of British North America and The Far West, the Home of the Salish and Déné* (1907).

HILLYARD. A city in Spokane Co., Wash., 5 miles northeast of Spokane, on the Great Northern Railroad (Map: Washington, H 3). It has extensive railroad shops and a high school and carries on a large trade in the products of the surrounding agricultural region, particularly fruits, berries, and grain. There are also planing mills. Pop., 1910, 3276.

HILMEND, hil'mend. See **HELMUND**.

HILMI PASHA, hêl'mê pâ-shâ', **HUSSEIN** (?-). A Turkish public official. He was successively Vali, or Governor-General, of Adana, then of the Yemen, inspector of the Roumelian vilayets, and inspector general in Macedonia. He became Minister of the Interior in 1908, served as Grand Vizier from May to December, 1909, and for part of 1912 was Minister of Justice. In the latter year he served also as Ambassador to Austria. In 1913 he was a second time offered the premiership, but he accepted instead the post of inspector general of the Syrian vilayets. In 1914, however, he did become Grand Vizier again, and in that office, during the European War, supported a policy of opposition to German influence and protection of British interests in Mesopotamia. See **TURKEY, History**.

HILLO, he'lo. The second town in size and the best seaport of the Hawaiian group, situated on Hilo Bay, on the eastern coast of the island of Hawaii (Map: Hawaii, F 4). It has a protected harbor with a lighthouse and contains a courthouse, a customhouse, and a library. The town is surrounded by luxuriant tropical forests, with extensive lava fields in the vicinity. There are delightful drives, and an excellent carriage road winds from the town up towards the crater of Kilauea. The population (district, 21,992 in 1910) is extremely heterogeneous, and the American element is prominent.

HILONGOS, or **ILONGOS,** ê-long'ôs. A town on the southwestern coast of the island of Leyte, Philippines, 96 miles from Tacloban (Map: Philippine Islands, E 5). Pop., 1903, 12,478.

HILPRECHT, hil'prêkt, **HERMANN VOLLBRAT** (1859-). An Assyriologist, born at Hohen-erxleben, Germany, and educated at Bernburg and Leipzig. In 1885 he was "repetent" in Old Testament theology at Erlangen and in the following year came to Philadelphia to become editor of the Oriental department of the *Sunday-School Times*. From 1887 to 1911 he was Clark research professor of Assyrian and professor of comparative Semitic philology at the University of Pennsylvania. He studied the Assyrian inscriptions (1882) in the British Museum, traveled in Syria, Babylonia, and Asia Minor, and became an authority on cuneiform paleography. Between 1893 and 1909 he reorganized the Babylonian department of the Imperial Ottoman Museum in Constantinople. In 1888 he accompanied the University of Pennsylvania expedition to Nippur and between 1895 and 1914 was in charge of four expeditions to the same place. The results of his excavations were of great importance. (See **NIPPUR**.) He was decorated with numerous orders, received several medals,

and was chosen to honorary membership in various foreign learned societies. His main works are: *Freibrief Nebuchadnezzar's I.* (1883); *Assyriaca* (1894); *Old Babylonian Inscriptions, Chiefly from Nippur* (1893); *Business Documents of Murashû Sons, of Nippur* (1898); *Ausgrabungen in Assyrien und Babylonien* (1904); *The Oldest Version of the Babylonian Deluge Story and the Temple Library of Nippur* (1910; also in Ger. ed.); and many contributions to the *Theologisches Literaturblatt* and other theological and Oriental journals. He was editor in chief of *The Babylonian Expedition of the University of Pennsylvania* (4th series).

HILTED (from Eng., AS. *hilt*, Icel. *hjalt*, OHG. *heilza*, *hilt*; probably connected ultimately with *hold*). A term used in heraldry (q.v.), to indicate the tincture of the handle of a sword.

HILTL, hil'tl, **JOHANN GEORG** (1826-78). A German actor and author, born in Berlin. After studying for the stage and acting in Hanover from 1843 to 1845, he was engaged at the Berlin Court Theatre, of which he was the manager from 1854 to 1861. His best acting was in serio-comic parts. He translated many French dramas and wrote a series of historical novels which had considerable popularity, though they lacked permanent literary value. The best known of these are: *Gefährvolle Wege* (1865); *Unter der roten Eminenz* (1869); *Der alte Derfflinger und seine Dragoner* (1871); *Das Rogenhauskomplott* (1873); *Die Damen von Danzig* (1874); *Auf immer verschwunden* (1878). His works on history are: *Der böhmische Krieg und der Mainfeldzug* (4th ed., 1873); *Der französische Krieg von 1870-71* (7th ed., 1895); *Preussische Königsgeschichten* (1875); *Unser Fritz* (5th ed., 1891); *Der grosse Kurfürst und seine Zeit* (3d ed., 1893).

HILTON, hil'ton, **JOHN** (1804-78). An English surgeon and anatomist. He was born at Castle Hedingham in Essex, was educated at Chelmsford, and in 1824 entered Guy's Hospital, where he became a demonstrator of anatomy in 1828, assistant surgeon in 1844, and full surgeon in 1849. In 1843 he accepted a fellowship in the Royal College of Surgeons, of which he was president in 1867; and as professor of anatomy and surgery in 1860-62 he delivered at the college his famous "Rest and Pain" lectures which were subsequently published in many editions. His lectureship at Guy's ended in 1870, and the rest of his life was spent in private practice. With the help of the artist Joseph Towne he constructed a large number of fine anatomical models for Guy's Hospital.

HILTON, WILLIAM (1786-1839). An English historical and portrait painter, born at Lincoln. He was a pupil of J. R. Smith the engraver and studied also at the Royal Academy, where his first work was exhibited in 1803. In 1813, having exhibited his "Miranda and Ferdinand," he was made A.R.A.; in 1819, R.A., his diploma picture being "Ganymede"; in 1827, keeper. His masterpiece, "Christ Crowned with Thorns" (1823), was bought for the Tate Gallery, which also possesses his "Diana at the Bath" and "Nature Blowing Bubbles." In the National Gallery are "Serena and the Red Cross Knight," illustrating canto 7 of book vi of Spenser's *Faerie Queene*; "Edith and Harold"; "Cupid Disarmed"; "Rebecca and Abraham's Servant." In the National Portrait Gallery is Hilton's portrait of John Keats, whom he knew personally.

HILVERSUM, hīl'vēr-sūm. A town in the Gooi Hill District, Province of North Holland, Netherlands, 18 miles southeast of Amsterdam (Map: Netherlands, D 2). It manufactures cotton goods, horse blankets, and carpets, is a favorite summer resort for Amsterdam residents, and has numerous schools, a convalescent home, and a town hall. Pop., 1900, 20,238; 1911, 32,938.

HIMALAYA, hī-mā'lā-yā (Skt., the abode of snow, from *hima*, snow + *ālaya*, abode). A mountain system in south central Asia, the most elevated and stupendous on the globe (Map: India, D 2). It is not, as sometimes represented, a single chain, but a system, consisting of several parallel and converging ranges, with a vast number of rugged, snowy peaks, separated by great elevated valleys and plateaus. On the north it descends to the elevated plateau of Tibet; on the south to the lowland drained by the Ganges and the Indus. It starts with the Karakorum in the Pamirs, whence it trends southeast and east, sweeping in a broad curve, convex southward. The mass of the Himalaya proper extends from the great bend of the Indus in the west to the great bend of the Brahmaputra in the east, or from long. 73° 23' to 95° 40' E., a distance of nearly 1500 miles. Their average breadth is about 150 miles. The mean elevation of the range is from 16,000 to 18,000 feet, but 45 of its peaks are now known to exceed 23,000 feet in height. Of these there are, in Kumaon, Nanda Devi, 25,600 feet; in Nepal, Dhawalagiri, 26,826 feet, Mount Everest, 29,002 (the highest known point on the globe): in Kashmir, Mounts Godwin-Austen, 28,278, Gush-erbrum, 26,378, Masherbrum, 25,600, and Kaka-pushi, 25,560 feet; in Bhutan, Chumalari, 23,946 feet, and Kutha Kangir, 24,740 feet; and on the borders of Sikkim and Nepal, Kunchinjunga, 23,156 feet, for a long time thought to be the second summit of the entire system. The south base of the Himalaya comprises three distinct regions—first, adjoining the plains of Hindustan, the *Terai*, a jungle or grass-covered marshy plain; next, the great belt of *Saul Wood*, stretching along a great part of the range; and beyond it the *Dhums*, a belt of detritus, extending to the foot of the true mountains. In the foothills above these regions, which are extremely unhealthy, are placed the sanitarium for troops—Darjeeling, Simla, Murree. The first is connected by a mountain railway with the Bengal system. There are no plains and but few lakes of large size in the Himalaya; the chief of the latter are Naini Tal in Kumaon, 6520 feet, and the Lake of Kashmir, 6125 feet above sea level. Small glacial lakes are abundant in the heads of the gorges.

Snow falls at rare intervals in the mountains as low as 2500 feet, but at 6000 feet it snows every winter. The limit of perennial snow in the main or central Himalaya is 16,200 feet on the south and 17,400 feet on the north side—an anomaly without doubt due to the dry atmosphere of Tibet and the small quantity of rain and snow that falls there. The high range of the Himalaya forms a vast screen, which intercepts and condenses nearly all the moisture carried by the southwest monsoons which blow from the Indian Ocean from May to October and deposits it on the southern face of the mountains; hence at Cherra Punji, 4200 feet above sea level, as much as 600 inches of rain has been known to fall in one year. The rain-

fall, however, varies greatly at different stations and altitudes, being but 30 inches per year where the Indus issues from the mountains. Glaciers are found in every part of the range above the snow line and reach down to 13,500 feet at Sikkim and to 11,500 feet in Kumaon; one of these, that of Deotal in Garhwal, is 17,945 feet above sea level. Among the largest of the glaciers are the Baltoro (33 miles in length) and Biafo (90 miles long) in the Karakorum Range. The passes in the Himalaya are the most elevated of the globe, and the greater number are upward of 17,000 feet in height. The highest known is Ibi-Gamin Pass into Garhwal, 20,457 feet, and the highest used for traffic is the Parang Pass in Spiti, 18,500 feet above sea level. All the passes above 16,000 feet are closed with snow from November till May. While the upheaval of the system probably commenced in early geologic times, the principal uplift occurred in the middle or late Tertiary period, in the mountain-making epoch which was signalized by the elevation of the alpine system of Europe. The geological structure of the Himalaya consists chiefly of gneiss mixed with mica schist in the north and bands of granite and syenite in the south. Earthquakes are of frequent occurrence in the central range. The Sanpo, or Brahmaputra, and Indus—which rise in close proximity to each other on the Tibetan side of the Himalaya—with their magnificent tributaries, derive their chief supplies from the melting of the snows of these mountains, and consequently are in flood at the hottest season of the year, when the moisture they supply is most needed. Trees and cultivated grains ordinarily attain their highest limits in the mountains at 11,800, and shrubs at 15,200 feet above sea level, a limited number of flowering plants attaining 19,500 feet. The tea plant can be cultivated along the entire southern face of the Himalaya to an elevation of 5000 feet, but the best is produced at from 2000 to 3000 feet above sea level. Tigers and apes are found at an elevation of 11,000, and the leopard at 13,000 feet, while the dog follows the herds over passes 18,000 feet high. Snakes are found at an elevation of 15,000 feet, but the highest limit of the mosquito is 8000 feet above sea level.

On account of the majestic height of this mountain range, and the apparent impossibility of reaching its summit, the imagination of the ancient Hindus invested it with the most mysterious properties and connected it with the history of some of their deities. In the Puranas (q.v.) the Himalaya is placed to the south of the fabulous mountain Meru, which stands in the centre of the world (see *MERU*), and described as the king of mountains, who was inaugurated as such when Prithu was installed in the government of the earth. As the abode of Siva, he is the goal of penitent pilgrims, who repair to his summit to win the favors of Siva. His wife was Mena, whom the Pitrīs, or demigods, engendered by the power of thought.

Peaks ascended in recent years are: Crystal Peak (19,400) and Pioneer Peak (23,000) in 1892 by Sir Martin Conway; Daimirai Peak (19,000) by Mummery and Collie in 1895; Siegfried Horn (18,600), Bullock-Workman (19,450), Kosen Gunge (21,000), in 1898; Mount Chogo (21,500), Mount Lungma (22,568), in 1903; Pinnacle Peak in 1906; Mount Nieves Penitentes (19,080) and D (20,571) in 1906 by Dr. and

Mrs. W. H. Workman; Kabru Peak (24,015) in 1907 by Longstaff. Consult W. H. Workman, *Call of the Snowy Hispar* (New York, 1911). See HINDU KUSH.

HIMALAYAN (hī-mā'lā-yan or hīm'ā-lā'an) **SUBREGION.** A faunal district of the Oriental region (q.v.), also styled Himalo-Chinese, because its most characteristic forms occur along the lower slopes of the Himalaya Mountains and their extension into China. See INDO-CHINESE SUBREGION.

HIMEJI, hē-mā'jē. The capital of the Japanese Province of Harima, situated in the southern part of Hondo, 34 miles by rail from Kobe and at the junction of three highways (Map: Japan, D 6). It has a well-preserved castle dating from the fourteenth century and the second in size in Japan. Cotton and stamped leather are among the products. Pop., 1903, 36,509; 1908, 41,028.

HIM'ERA (Lat., from Gk. Ἱμέρα). A city on the north coast of Sicily, founded 649 B.C. by colonists from Zancle (Messana) and exiles from Syracuse. In 481-480 B.C. the tyrant Terillus, expelled by Theron of Agrigentum, invoked the aid of the Carthaginians. They sent a large army under Hamilcar I, but were totally defeated at Himera by the Greeks under Gelon of Syracuse. Thrasydæus, son of Theron, brought a large body of Doric emigrants to the city in 476; but a few years later, after the death of Theron, Thrasydæus was driven from Agrigentum by Hiero, and Himera became free. It seems to have enjoyed great prosperity during the remainder of the fifth century. In 415 it sided with Syracuse against Athens. In 409 it was razed to the ground by the Carthaginians. A new city, Thermæ Himerenses (or Himeræ), was founded in 407 B.C., about 8 miles west of the former site. The name of this new city was derived from the famous hot spring in which Hercules was said to have bathed. The new city remained in Carthaginian hands until it was taken by the Romans during the First Punic War. It was peculiarly favored by them and was left a free city under its own laws. In the time of Cicero it was a flourishing town, though not very large. Under Augustus it became a colony. Ergoteles, an Olympian victor, celebrated by Pindar, was a citizen of Himera. Stesichorus (q.v.) the poet was a native of the city, and his statue was preserved at Thermæ in the time of Cicero. Agathocles (q.v.), the great tyrant of Syracuse, was a native of Thermæ. Consult "Himera," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913).

HIMERIUS (Lat., from Gk. Ἱέρπιος) (c.315-c.386). A Greek teacher of rhetoric. He was born at Prusa in Bithynia and lived for some time at Antioch at the court of the Emperor Julian as his secretary. After Julian's death he settled in Athens as a teacher of rhetoric. Among his pupils were Gregory Nazianzen and Basil the Great. He was a pagan, but did not attack Christianity. His works, of which 24 orations are preserved complete, with fragments of 10 others (ed. by Dübner, 1849), were in a florid, artificial style. They are valuable because of references to events of the time or quotations from a more classic period, especially from the lyric poets. Consult Eduard Norden, *Die antike Kunstprosa* (2d ed., Leipzig, 1909).

HIM'EROS (Lat., from Gk. ἱμερος, longing,

yearning). In Greek mythology, the personification of longing and desire. He is the companion of Eros and of Aphrodite.

HIMIL'CAR. See HIMILCO, 2.

HIMIL'CO (Phœnician, grace of Milkar, Gk. Ἱμῖλκων, *Himilkōn*). 1. A Carthaginian general, son of Hanno, who commanded the expedition against Sicily (406 B.C.), and conquered the western part of that island. When Dionysius of Syracuse renewed the war (397 B.C.), Himilco again commanded the Carthaginians, at first with success; but subsequently Dionysius attacked Himilco when the latter was greatly disabled by pestilence and forced him to capitulate. Himilco abandoned his allies and mercenaries to the mercy of the enemy and paid a large gratuity for permission to withdraw with his native Carthaginians. The disgrace of this surrender so weighed upon him that soon after returning to Carthage he committed suicide. Consult "Himilkon, 1," in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. viii (Stuttgart, 1913). 2. HIMILCO, or HIMILCAR. An early Carthaginian navigator of uncertain date, who explored the northwest coast of Europe at the same time that Hanno (see HANNO, 1) explored the west coast of Africa. Avienus has preserved some fragments of the history of this voyage, in which mention is made of the Hiberni and Albioni and of a promontory, Cestrymnis, thought to be Cornwall, and a group of islands, Cestrymnides, thought to be the Scilly Islands.

HIMILY, ān'lē, LOUIS AUGUSTE (1823-1906). A French author, born at Strassburg. He studied paleography at the Ecole des Chartes from 1845 to 1847 and then became *agrégé* in history and *Docteur ès lettres*, professor of history at Rollin College, and (1863) professor of geography in the faculty of letters, Paris, where he was dean from 1881 to 1898. In 1884 he was chosen a member of the Institute (q.v.), section of the Académie des Sciences Morales et Politiques. Besides his thesis, *Wala et Louis le Débonnaire* (1849), he wrote *De la décadence carlovingienne* (1851) and a well-known *Histoire de la formation territoriale des états de l'Europe centrale* (2 vols., 1876).

HIMMALEH, hīm-mā'lē. See HIMALAYA.

HIM'YARITES. The name of a people in southwestern Arabia, the Homerites of Ptolemy. The earlier history of the Kingdom of Himyar before its conquest by the King of Saba and Raidan in 115 B.C. is not known. It was probably with the aid of the Arsacid dynasty in Persia that it recovered its independence. In the time when Saba and Raidan were ruled by kings of Axum (300-378 A.D.) the importance of Himyar grew, and, assisted in all probability by the Sasanid rulers, its power spread in the fifth century. Its most famous King, Dhu Nuwas, was, however, conquered by the Axumites, who seem to have been aided by the Byzantine Emperor, Justin, in 525 A.D. The capital of Himyar was at Zafar. Since the Himyaritic Kingdom flourished in the days when Greek writers became familiar with Arabia, the term was long used as a designation of the people of Jemen in general; but this use of it has now been abandoned in view of the greater importance of the Minean and Sabæan kingdoms. See ARABIA; MINÆANS; SABÆANS.

HINCKLEY, hīnk'li. A manufacturing and market town in Leicestershire, England, 14 miles southwest of Leicester (Map: England,

E 4). Its chief buildings are the Gothic church of St. Mary, the Roman Catholic priory and Academy of St. Peter, a grammar school, and a town hall. It has manufactures of cotton hosiery, boots, bricks, tile, and lime. In the neighborhood are mineral springs. Hinckley stands on old Watling Street, the famous Roman road; it was created a barony soon after the Conquest and had a castle and a Benedictine priory; its borough privileges were annulled by Edward IV. Pop., 1901, 11,304; 1911, 12,837.

HINCKLEY, ALLEN (1877-). An American dramatic bass, born in Boston. While a student at the University of Pennsylvania, he also studied singing in Philadelphia. After graduation he went to New York, where he was a student of Oscar Saenger. His début at the Hamburg Opera as the King in *Lohengrin*, in 1903, secured for him a five-year contract with that institution. His fine voice and impressive stage appearance made him an ideal interpreter of the great Wagnerian rôles, so that he was heard at Covent Garden and Bayreuth. In 1908 he became a member of the Metropolitan Opera Company.

HINCKLEY, THOMAS (1618-1706). Governor of Plymouth Colony from 1681, except during the administration of Sir Edmund Andros, until 1692, when Plymouth was united with Massachusetts. Of English birth, he came to the New England Colonies in 1635 and began to be active in the affairs of Plymouth in 1639 and was successively deputy (1645), representative (1647), and magistrate (1658-80). In 1680 he was also Deputy Governor. Seven years before his appointment as Governor he held the office of commissioner on the central board of the Plymouth and Massachusetts Colonies and continued in that position until the end of his governorship and was afterward a councilor. Governor Hinckley collected several volumes of papers which are now in the possession of the Boston Public Library.

HINCKS, EDWARD (1792-1866). An Irish Orientalist, eldest son of Thomas Dix Hincks, the Presbyterian divine, and brother of Sir Francis Hincks, the Canadian statesman. Edward was born at Cork, and graduated at Trinity College, Dublin, in 1811. In 1825 he was appointed rector of Killyleagh, County Down, where, in spite of his seclusion, he undertook studies in hieroglyphics (1833) and wrote for the *Dublin University Magazine* and the *Journal of Sacred Literature*. Simultaneously with Rawlinson he discovered the syllabic character of the Assyrian cuneiform letters, and he had earlier written on the Egyptian hieroglyphics. He began an Assyrian grammar, but did not leave materials for its completion.

HINCKS, SIR FRANCIS (1807-85). A Canadian statesman, born in Cork, Ireland, and educated at Fermoy and at the Royal Belfast Institution. Having received a business training, he emigrated to Upper Canada in 1832, and settling in Toronto became a wholesale merchant. His interest in politics led him to found and edit the *Examiner* (1838), a Liberal newspaper, in which he advocated responsible government. In 1841 he was elected a member of the Canada Legislative Assembly, and in 1842-43 was Inspector General (Minister of Finance) in the first Baldwin-Lafontaine administration. In 1844 he failed of reelection, and went to Montreal, where he established the *Pilot* and for several years was its chief contributor. He con-

tinued to defend responsible government and demanded the abolition of the clergy reserves and seigniorial tenures. (See CANADA, *History*.) In the second Baldwin-Lafontaine administration (1848-51) Hincks was again Inspector General and had charge of the commercial and economic measures. He procured active governmental aid to railway building and started the movement for reciprocity in natural products with the United States—not realized until 1854. (See RECIPROCITY TREATY.) In 1849 he was a special envoy to England in regard to the Rebellion Losses agitation. In the Hincks-Morin administration (1851-54), of which he was joint Premier, Hincks's wide knowledge of trade and financial affairs was used to promote a commercial treaty with the United States and to develop mines and railways. In the latter part of his administration he was opposed by the advanced Liberals of Upper Canada for failure promptly to carry out their programme of secularizing the clergy reserves and for yielding to the Roman Catholic demand of separate schools. After his defeat he was made Governor of Barbados (1855-62) and of British Guiana (1862-69). He returned to Canada and in 1869-73 was Minister of Finance in the Coalition administration of Sir John A. Macdonald. He afterward removed to Montreal, where he edited the *Journal of Commerce*. In 1869 he was knighted. His principal publications are: *Canada: Its Financial Position and Resources* (1849); *Reply to the Speech of Joseph Howe on the Union of the North American Provinces*, (1855); *Religious Endowments in Canada* (1869); *The Boundaries Formerly in Dispute between Great Britain and the United States* (1885); *Reminiscences of my Public Life* (1885), a work of permanent value on the political history of Canada in 1840-54. Consult S. B. Leacock, *Baldwin, Lafontaine, Hincks, in the "Makers of Canada Series"* (Toronto, 1907).

HINCMAR (806-882). A celebrated churchman of the ninth century. He was born presumably in Toulouse, as he belonged to the family of the counts of that province. He was educated in the monastery of Saint-Denis, near Paris, and was intrusted with the framing and carrying out of a plan for the reformation of the monastery. In 845 he was elected Archbishop of Rheims. In this position he had to deal with the case of the alleged heretic Gottschalk (q.v.), whom he treated with great severity. The followers of his predecessor, Ebbo, who had been deposed, remained bitter enemies. In 862 he became involved in a controversy with Pope Nicholas I. Rothadius, Bishop of Soissons and Suffragan to Hincmar, deposed a priest of his diocese, who appealed to Hincmar, as Metropolitan, and was ordered by him to be restored to office. Rothadius, resisting this order and having been in consequence condemned and excommunicated by the Archbishop, appealed to the Pope, who ordered Hincmar to restore Rothadius, or to appear at Rome in person, or by his representative, to vindicate the sentence. Hincmar sent a legate to Rome, but refused to restore the deposed Bishop; whereupon Nicholas annulled the sentence and required that the cause should again be heard in Rome. Hincmar, after some demur, was forced to acquiesce. The cause of Rothadius was reexamined, and he was acquitted and restored to his see. Under the successor of Nicholas, Adrian II, a question arose as to the succession to the sovereignty of

Lorraine on the death of King Lothaire, the Pope favoring the pretensions of the Emperor Louis II in opposition to those of Charles the Bald of France. To the mandate which Adrian addressed to the subjects of Charles and to the nobles of Lorraine, accompanied by a menace of the censures of the Church, Hincmar offered a firm and persistent opposition. He was equally firm in resisting the undue extension of the royal prerogative in ecclesiastical affairs. Hincmar died at Eprenay, whither he had fled from the Normans, Dec. 21, 882. His works were collected by Sirmond (Paris, 1645), reprinted in Migne, *Patrol. Lat.*, cxxv-cxxvi. Many others of his works are still in manuscripts. For his life, consult: J. C. Prichard, *Life and Times of Hincmar* (Littlemore, 1849); C. N. D. Diez, *De Hincmari vita et ingenio* (Sens, 1859); W. F. Gess, *Merkwürdigkeiten aus dem Leben und den Schriften Hincmars* (Göttingen, 1860); Carl von Noorden, *Hinkmar, Erzbischof von Reims* (Bonn, 1863); Theodor Foerster, *Drei Erzbischofe vor tausend Jahren* (Gütersloh, 1873); Auguste Vidieu, *Hincmar de Reims; étude sur le IX^e siècle* (Paris, 1875); Max Sdralek, *Hincmars von Reims kanonistisches Gutachten über die Ehescheidung des Königs Lothars II.* (Freiburg-im-Breisgau, 1881); J. H. Schorörs, *Hinkmar, Erzbischof von Reims* (ib., 1884).

HIND, hind (AS., Icel. *hind*, OHG. *hinta*, Ger. *Hinde*, hind; probably connected with Goth. *hinnan*, to catch, related to AS. *huntian*, Eng. *hunt*, possibly connected with Gk. *κεῖνός*, *kemas*, gazelle). The female of the red deer, a correlative of "stag" or "hart" (q.v.). In strict use, according to the ancient laws and customs of venery, it did not become the designation of a female red deer until the third year of its age. Latterly the word has become, outside of England, a synonym of "doe."

HIND. A fish. See GROUPE.

HIND, HENRY YOULE (1823-1908). A Canadian explorer and geologist, born in Nottingham, England. He was educated at Leipzig and at Cambridge and went to the United States in 1846 and in 1847 to Upper Canada. He was made mathematical master in the provincial normal school and in 1851 became professor of chemistry and geology in Trinity College, Toronto. In 1857 he was appointed geologist to the Red River exploring expedition, and in 1858 he was placed in charge of the expedition sent to explore the country between the Red and Saskatchewan rivers. His reports on these expeditions were published by the Canadian and British parliaments. In 1861 he made an exploratory survey in Labrador. He removed to New Brunswick in 1864, made a geological survey of that province, and later, having gone to Nova Scotia, was appointed professor of chemistry and natural history in King's College, Windsor. In 1876 he made a geological exploration of the northeastern part of Newfoundland and the Atlantic coast of Labrador. He prominently assisted in the scientific work of the Fisheries Commission which met in Halifax in 1877 under the provisions of the Treaty of Washington (q.v.). In 1860 he was elected a fellow of the Royal Geographical Society. He published the *Northwest Territory* (1859) and many other reports of his geological and exploring expeditions.

HIND, JOHN RUSSELL (1823-95). An English astronomer, born at Nottingham. When a mere boy, he devoted himself to astronomy and

at the age of 17 he was given a position in the Royal Observatory at Greenwich. In 1844 he was appointed member of the commission sent to determine the exact longitude of Valentia. On his return he was appointed observer in Bishop's Observatory, Regent's Park, London. He calculated the orbits of a number of planets and comets, noted many new variable stars and nebulae, and discovered 10 new planetoids (q.v.), viz., Iris and Flora in 1847; Victoria in 1850; Irene in 1851; Melpomene, Fortuna, Calliope, and Thalia, in 1852; Euterpe in 1853; and Urania in 1854. In 1851 Hind received from the Academy of Sciences in Paris the Lalande medal and was elected a corresponding member. In 1852 he received the gold medal of the Astronomical Society of London and obtained a pension of £200 a year from the British government. He was superintendent of the *Nautical Almanac* in 1857-91. His scientific papers have generally been published in the *Transactions of the Astronomical Society*, the *Comptes Rendus*, and the *Astronomische Nachrichten*. His principal popular works are: *The Solar System* (1846); *Astronomical Vocabulary* (1852); *The Comets* (1852); *Descriptive Treatise on Comets* (1857); *Introduction to Astronomy* (3d ed., 1871). He was president of the Royal Astronomical Society in 1880.

HIND AND THE PANTHER, THE. A satirical poem by John Dryden (1687). It is a defense of the Roman Catholic church in the form of an allegory, in which all characters are represented by animals. The Hind stands for the Roman, the Panther for the Anglican church.

HINDENBURG, hin'den-burg, KARL FRIEDRICH (1741-1808). A German mathematician, born at Dresden. Educated at Leipzig, he became docent (1771) and professor of philosophy (1781) in the university there. In 1786 he became professor of physics. He edited the *Magazin für reine und angewandte Mathematik*, with Bernoulli (1786-88), and the *Archiv der reinen und angewandten Mathematik* (1794-99); but he is best known as the discoverer of combinatory analysis and as author of *Kombinatorisch-analytische Abhandlungen* (1796 and 1800).

HINDENBURG, PAUL VON BENECKENDORFF UND VON (1847-). A German soldier, born in Posen. He became a subaltern in 1866, served in the war against Austria, distinguishing himself at the battle of Königgratz, and participated during the Franco-Prussian War in the storming of St. Privat, near Metz, and in the battle of Sedan. After receiving a military education (1872-75) he served in various capacities with the general staff—in active service in the field and as head of a bureau of the War Department. He was promoted major general in 1900 and lieutenant general in 1903, was retired in 1911, but, when the Great European War broke out, in 1914, was recalled and made general-oberst, with chief command of the campaign in East Prussia against Russia. At Tannenberg he won one of the greatest German victories in the campaign against Russia. In 1870 and again in 1914 he was decorated with the order of the Iron Cross, and in November of the latter year he was made field marshal. See WAR IN EUROPE.

HINDERSIN, GUSTAV EDUARD VON (1804-72). A Prussian soldier, born at Wernigerode. He joined the Prussian artillery in 1820, became

an officer in 1825, attended the Kriegsakademie at Berlin in 1830-37, and in 1841 was detailed for duty on the general staff, of the topographical section of which he was later director. As lieutenant general, he had charge of the artillery attack on Düppel during the war with Denmark in 1864 and for his services was ennobled. He was chief of artillery on the King's staff during the war with Austria in 1866 and during the Franco-Prussian War. His energy led to great improvement of the artillery efficiency, to the substitution of the rifled gun for the smoothbore, and to the organization of the artillery school.

HINDI. See HINDUSTANI LANGUAGE AND LITERATURE.

HINDLEY, hīnd'li. An urban district in Lancashire, England, 3 miles southeast of Wigan. Coal mining and cotton manufactures are important industries. Its chief buildings are the free grammar school and the old parish church, which was desecrated by the Cavaliers during the Puritan Revolution. The municipality operates markets and remunerative gas and water works. Pop., 1901, 23,504; 1911, 24,100.

HINDMAN, hīnd'man, THOMAS CARMICHAEL (1818-68). A Confederate officer in the American Civil War. He was born in Tennessee, was educated in the common schools, studied law, and removed to Mississippi to practice his profession. As a lieutenant in a Mississippi regiment, he took part in the Mexican War and was a Democratic member of Congress from 1858 to 1861. He was appointed to the command of a brigade in the Confederate army soon after the Civil War began and first served under Gen. Simon Buckner in Kentucky. At Memphis he was in command and was afterward defeated at the battles of Newtonia and Prairie Grove. Promoted to be a major general at the battle of Shiloh, he was transferred to Arkansas. After the close of the war he went to the city of Mexico, but finally returned and settled in Arkansas in 1867. The following year General Hindman was murdered by one of his former soldiers in revenge for some disciplinary act during the war.

HINDOOSTAN, hīn'dōō-stān'. See HINDUSTAN.

HINDU CHRONOLOGY. See VEDA.

HINDUISM. The national religion of India. The result of a compromise between Brahmanism (q.v.) and the religious ideas of the lower Aryan castes and the non-Aryan population of India, modern Hinduism is as diversified as there are degrees in this compromise. Standard Hinduism is characterized by professed reverence for the Veda and the traditions of the Brahmins, with the consequent acknowledgment of Brahman privileges; the observance of certain prescriptions concerning food, marriage, and burial; and the practice of a number of rites, sacraments, and forms of divine worship. But if any one of the traits alluded to in this formal definition be chosen as a test of Hinduism, its application would lead to impossible consequences. This holds true of even its most tenacious traits, such as the cremation of the dead, the respect for the cow, and the employment of Brahman ministrations. Nor is Hinduism wholly coextensive with the caste system. (See CASTE.) This many-sided and elusive aspect of Hinduism is quite natural in view of its syncretism, which has incorporated animist, fetishist, and shamanist elements to a philos-

ophy derived from Vedic and Sankhya (q.v.) sources and to Vedic worship has added sectarianism, mysticism and magic, theriolatry and phallicism, the cult of numerous local divinities, and reverence for holy men.

The movement has not always been from Brahmanism downward; local and primitive faiths and rites have imitated the appearance of Hinduism into which they were finally merged. Hinduism has thus come to comprise "entirely different sets of ideas, or, one may say, widely different conceptions of the world and life. At one end, at the lower end of the series, is Animism, an essentially materialistic theory of things which seeks by means of magic to ward off or to forestall physical disasters, which looks no further than the world of sense. . . . At the other end is Pantheism, combined with a system of transcendental metaphysics." (Risley.) The author just quoted has, in fact, epigrammatically defined Hinduism as "magic tempered by metaphysics." Related to this character of Hinduism is the importance it attaches to a sensuous symbolism, which, to a non-Hindu at least, frequently seems to obscure rather than bring out the underlying idea. This peculiarity explains the lapse of philosophical schools of religion into mere formalism, with its exaggerated emphasis of externals to the detriment of real religious feeling. On the other hand, what at first glance resembles idol worship may be a consciously symbolic act of reverence.

The Sanskrit word *dharma* (right, duty, law, usage, institution, conduct, morality, piety, religion) exactly indicates the scope of Hinduism. The terms "Brahmanism" and "Hinduism" are often interchangeable; usually, however, the former is restricted to the orthodox religion of the Brahmins, which is nearer Vedic belief than the newer and more popular forms of worship which constitute Hinduism proper.

According to the census of 1911, Hinduism is professed by 217,586,900 individuals out of a total Indian population of upward of 313,000,000. The religion next in numbers is Mohammedanism, which in India counts over 66,000,000 adherents. Buddhism claims 10,721,449 people, while upward of 10,000,000 are classed as animists. The non-orthodox sect of the Sikhs is represented by more than 3,000,000 individuals and Jainism by some 1,250,000. The immense preponderance of Hinduism is therefore obvious. Its numerical strength is also an index of the diversity of this religion which is "monotheistic in essence, multifarious and grotesque polytheism in semblance, with pantheism for a harmonizing principle." (Moore.) We are thus led to distinguish between a purely speculative and theological and a low sectarian aspect of this faith. True sectarianism is to a large extent subversive of orthodoxy. Frequently antagonistic to the Brahmins, the sectaries revere religious teachers (*gurus*) of their own and often set aside caste differences within their fold. The sects have special Puranas (see PURANA) and other religious and semireligious works, liturgies, formulas (*mantras*), and emblems to which they tenaciously cling, and which differentiate them from one another. A position apart is held by the numerous ascetics, religious mendicants, and Yogi jugglers, whose sectarianism is often nominal, and who may comprise several sects in the same order. A general sketch of the development of Hindu religion will be found under the heading INDIA, section *Religion*, while

under BRAHMANISM is treated the change of Vedic religion to Brahmanism and early Hinduism. (See INDIAN MYTHOLOGY.) The present article endeavors to touch on the philosophic aspects of Hinduism. The written sources of Hinduism are the epics of Mahabharata and Ramayana, and especially the Bhagavad-Gita and Harivansa portions of the former, the Puranas, and other sectarian writings, such as the *Bhakti Sūtras* of Sāṅdilya and Nārada, the philosophical writings of the founders of sects, their commentators and opponents, and numerous treatises of edification, stotras, or odes in praise of the divinity, etc.

Two doctrines lay from the time of the Upanishads (q.v.) at the basis of every Hindu speculative system, viz., the doctrine of an indefinite series of rebirths (*saṁsāra*, or transmigration), and that of the permanence of the effects of one's action (*Karma*, *adṛṣṭa*), all Hindus agreeing that every action invariably brings about its reward or punishment in either this life or in some future existence, and that, conversely, the nature of one's existence, the lot of man, is rigorously determined by the merit or demerit incurred by previous actions. This is held to be possible because of the existence of a "subtle body" (*sūkṣma śarīra*) which accompanies the soul in all its wanderings. Several corollaries of these doctrines are important from a religious point of view. Between the gods and men there is thus no difference of essence, but only of degree, because both gods and men are but steps in the *saṁsāra*. In consequence of this belief atheism does not in India possess the significance it has in the religious history of Europe. God, moreover, the highest good, came to be regarded as the ultimate and desirable goal of universal evolution. To reach him, to obtain deliverance (*mukṭi*, *mokṣa*) from the sluggish course of *saṁsāra* became the supreme task of theology, man's aim being to obtain at first a partial state of freedom (*jīvanmukṭi*), which merges into perennial bliss when all the previous karma has been spent out. This conception is foreign to the Vedic age when the worshiper's sole concern was to demand of the gods certain material benefits in the return for the sacrifice. The Brahmanas may be said to countenance a "practical road" (*Karma-marga*) to salvation, a view which later received an elaborate treatment at the hands of the famous Kumārila (700 A.D.). Opposed to this is the Upanishad (q.v.) theory of saving knowledge (*jñānakāṇḍa*), which, elaborated in the Vedānta (q.v.) system of philosophy, is practically identical with esoteric Brahmanism. The chief theological contribution of Hinduism, on the other hand, is the doctrine that salvation is primarily dependent on *bhakti*, faith or devotion to one divinity.* It is therefore essentially theistic as against the pantheistic Vedantism. The opposition of the two is not, however, felt in religious practice and is diminished by the belief in the incarnations (*avatāras*) of Vishnu, which bridge the gulf between an immanent all-god and a personal deity. The personal pantheism of Krishnaism has been compared with

the Christian doctrine of the Son's incarnation, but differs from it inasmuch as Christianity is not pantheistic. In Hinduism, on the other hand, "the immanence of God in the external world and in the heart of man is the cardinal doctrine." (Bhandarkar.) God is therefore both the material and the efficient cause of the world in the majority of Hindu systems. Nevertheless philosophic Sivaism, and some schools of Vishnuism, admit a dualism of matter and mind which entails a differentiation, in some respects at least, of God from the world.

The Bhakti doctrine is especially promulgated by the Vishnuite schools; but there also is a Siva-bhakti. Originally a religion of reform, like Jainism and Buddhism, and likewise directed against Brahmanism, the new faith appeared not much later than the two great heterodox religions as a monotheism preaching "the religion of a single-minded love and devotion to One," Ekāntika Dharma. In a sectarian form this monotheism was absorbed by the Vāsudeva worship of the Bhāgavata and Pancharātra sects and flourished among the Kshatriya tribe of the Sātvatas. The religion was well established in the fourth century B.C., a date which, according to Sir R. Bhandarkar, is the *terminus ad quem* of the Bhagavad-Gita, the Vishnuite Bible. This poem shows strong influence of Upanishad, Sankhya, and Yoga (qq.v.) ideas—a fact which must have increased its popularity. Successive identification of the Bhāgavata divinity with Puruṣa Nārāyaṇa, the primeval Man, with the Vedic Vishnu (q.v.), the cowherd boy-divinity Gopāla-Kṛṣṇa of Gokula (see KRISHNA), and with the hero Rāma transformed the original monism into a number of related sects. Vishnu finally became an all-god, and his religion the sectarian aspect of Vedantic monism. Vedantic Sivaism, as Professor Hopkins has rightly observed, is, on the contrary, only nominal Sivaism, or, if true Sivaism, only nominally Vedantic.

The Vedantic philosophy received its definite formulation in the ninth century A.D., when Sankara, commenting on the Brahma Sūtra of Bādarāyana, elaborated the doctrine of idealist singularism which declared the phenomenal world an illusion (*māyā*) due to "ignorance" conceived as an active principle. The only true reality is God, or absolute being, with whom the saved soul is identical. Sankara thus opposed a transcendent (*nirguṇa*) divinity, which is incogitable to the personal, "qualified" (*saguṇa*) Brahma of the Upanishads, and declared the latter to be a concession to the vulgar minds. To the enlightened practical worship has no importance. This doctrine soon found an echo among the enlightened Brahmins and was strengthened by the elaboration of a kindred psychology and cosmology. As it endangered practical religion, it also had many opponents. One of them, the Vishnuite Rāmānuja (born in 1016 A.D.), revived the old teaching of the Bhagavad-Gita, and its Sankhya principles. His system of "qualified monism" (*viśiṣṭādvaita*) teaches that God is, not pure being, as held Sankara, but a personality qualified by all the perfections, such as intelligence, joy, power, mercy, etc. The insensate world (*aśit*) and the individual, atomic, souls which together constitute the *chit*, are both the body, or attribute (*prakṛti*) of the cosmic soul that controls the universe (Īśvara, identified with Nārāyaṇa). God appears in several modes, the highest being

* While Vedāntin Brahmins restrict salvation to members of the Brahmin class, the others having first to be born in this class before they may be saved, modern Hinduism promises salvation to all the people in its fold; even Sudras. Hinduism is to Vedic religion what the New Testament is to the Old, and some scholars, like Grierson, believe that its establishment was influenced by Christian ideas coming from the northwest.

Para and Viuha, and the next Vibhava, which comprises the 10 avatāras of Vishnu, and Antaryāmin, or inner soul, perceived by the Yogins; and in the idols. The practice of *bhakti*, which he conceived as identical with the *upāsana* (meditation) of the Upanishads, is not open to the Sudras, who know not the Vedas and the rites, but even they may attain salvation if they abandon the world and throw themselves on God's mercy (*prapatti*, surrender). The saved soul enjoys all the attributes of God save the creative. Rāmānuja has many followers in the south of India. His contemporary Nimbārka taught that the *chit* and *achit* constitute the Sakti, or divine capacity, being a development of his potentiality. Bhakti he conceived in an erotic sense (the term is applied in Hindu theosophy to the female generative principle). He adored the divine pair of Krishna and his mistress Rādhā and won many followers in Bengal. A more refined system was elaborated by Madhva-Anandatīrtha, an eclectic who denied God as a material cause of the universe (thirteenth century). His followers are recruited among the Brahmins.

Vedantic pseudo-Sivaism is typified in the Kashmir school (ninth to eleventh centuries A.D.), which held that the world is a reflection of Siva's splendor in himself. God is therefore the archetype of the world and the source of all true knowledge. These ideas were not destined to become popular. Popular Sivaism is, as a rule, associated with brutal and obscene rites and with degraded asceticism. This evil side of the faith was apparent from the beginning of the cult; Rudra-Siva being a terrible divinity, the lord of wild places, of cemeteries and forests and of the people who live in them, thieves and outcasts. The horrible sects of the Kāpālas and Kālāmukhas, who practiced human sacrifices, and the erratic (*antimargika*) school of Pāsupatas, who took refuge in the mystic and extravagant practices of the Yogi type, illustrate low Sivaism. From the philosophical point of view, however, the last-named school holds out, as does ordinary Sivaism (*Siddhānta-darśana*, *Saivādharśana*), the theory of a material or formative principle (*prakṛti*, *Māyā*) distinct from Siva but under his control. The Lingayats of Dekkan, an anti-Brahmanic sect which originated towards the middle of the eleventh century of our era, show Vishnuite influence. They hold that Siva, or Linga,* qualified by Sakti, is the efficient and material cause of the world, "the instructor and redeemer of mankind" (Bhandarkar), to whom the souls aspire by virtue of an innate bhakti. Devotion and renunciation to the world are necessary to salvation. The Virasaivas, or Lingayats, are recognized by the phallus, or *linga*, which they usually carry in a box suspended from their neck.

While Sivaism appealed to the enlightened few and to the rabble, Vishnuism is a middle-class religion divided into two main branches—a purer, or Ramaite, and a lower and less chaste Krishnaite. The cult of Rāma, the epic hero conceived as an incarnation of Krishna, and of his spouse Sītā, received a mighty impetus in the fourteenth century when Rāmānuja, preaching in the vernacular, called to the fold even the degraded classes. Although his disciples

(Avadhūtas, the freed) threw off many sectarian practices, they are still true Hindus. They also show reverence for the monkey Hanuman, the mythical friend of Rāma. A number of modern reformers claiming fidelity to Rāmananda's teaching, stripped his theology of all its sectarian characteristics until it became, under Moslem influence, a pure unitarianism. The most famous of these were Dādu, a contemporary of Akbar, the weaver* Kabir (fifteenth century), and Nanak, the reputed founder of the Sikhs (q.v.). Rāma faith was professed by the poet† Tulsī Dāsa (1574-1623), who, although not a sect founder, wrote a Hindi Ramayana which may be called the New Testament of Vishnuism, both for its moral doctrines and also because Rāma is therein said to have sacrificed himself for the salvation of men. The two Marāṭha saints Nāmdev (end of fourteenth century) and Tukārām (born in 1607 A.D.) may be mentioned here. They, like Kabir, denounced mere formalism and laid stress on moral purification as prerequisite to salvation. The erotic aspect of the Krishna-Rādhā cult is most noticeable among the followers of Vallabha (sixteenth century); they are wealthy middle-class men of Gujarat and Rajputana, who imitate their sporting divinity by leading an easy and care-free life. Less sensual is the sect inaugurated by Chaitanya of Bengal, a contemporary of Luther; it represents the mystical and emotional side of bhakti. Both sects show an exaggerated respect for their religious teachers (*gurus*, *gosains*).

We may reckon among the Sivaites the votaries of Ganeśa, whose cult has been contaminated by that of Vināyaka, the prince of evil spirits, the followers of Karttikeya, once numerous, and most of the Yogis. A peculiar position is held by the Śāktas, or worshipers of the female principle (*śakti*), personified in Siva's consort of many names, Mahādevī, Durgā, Kālī, Pārvatī, Kālālā, etc. The śakti cult has a bloody and a sensual form. (See THUG; TANTRA.) It is among the "left-hand" Śāktas, who form a secret association chiefly represented in East Bengal and Assam, that unspeakable orgies form a part of worship. Yet even these gross aberrations admit of a symbolic interpretation strengthened by a philosophic terminology. Yoga exercises of all kinds, mystic gestures (*mudrās*), cabalistic formulas (*mantras*), symbolic emblems, and the "five m's" (viz., *māḍya*, wine, *māṃsa*, meat, *mātsya*, fish, *mudrā*, parched grain, and *maithuna*, union of the sexes) play an important rôle in Śākta worship, which is typically syncretistic inasmuch as it associates phallicism, magic, and shamanism with Vedic rites, fetishism, and the worship of mother divinities. It is pleasant to oppose to this degraded worship and its accompanying beliefs not only the pure unitarianism professed by the enlightened members of the Brahmo-Somaj (q.v.), the more national religion of the Arya Somaj, the philosophic Vedantins, and the nonsectarian worshipers of one god under the name of Rāma, Viṭhobā, etc., but also the uncultured adherents of both monotheism and polytheism found in Berar. Hinduism is thus seen to contain an

* These later reformers are sometimes of low station. Senā was a barber.

† To Vishnuism belong the Sanskrit poet Jayadeva and the Tamil Thiruvalluva Nāyanār (author of the Kurral); while the Tamil saint Tīrūnāna Sambandha and the poet Manikka Vāsagar were Sivaites.

* Linga is the phallus; but the Sankhya school uses the term for the "subtle body" which is the unpershable substratum of psychic life. Among the more refined Lingayats God is identical with the ether linga, which is infinity.

infinity of potencies, good and bad. Contrasted with the Vedic religion, it shows a more advanced stage because it appeals to more classes of people than did Vedic worship, and because it no longer is content with formalist ritualism, but lays stress on love as a means of salvation. But although, under the influence of Mohammedanism and Christianity, it has cast off some of its specific Hindu garb, Hinduism still continues to be a nationalist and not a universal religion.

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HINDU KUSH, hin'doo kōosh, or INDIAN CAUCASUS. A range of mountains, forming the westward continuation of the Himalaya, being sometimes reckoned a part of that colossal range (Map: Afghanistan, N 5). It extends from the Upper Indus on the east to the Bamian Pass (beyond which the continuing range is generally designated Safed-Koh) on the west, stretching in latitude between 34° and 36° N. and in longitude between 68° and 74° 30' E., with a length of about 500 miles. Nearly the whole of it is contained in Afghanistan. The Oxus, or Amu-Darya, has its source in its northern ridges, and many tributaries of the Indus flow down the south slope. For the first 100 miles west of the Pamirs it is flat-topped with lakes and no peaks and with passes ranging in altitude from 12,500 to 17,500 feet. Farther westward it becomes higher, and its plateau summit breaks up into peaks of which Tirach Mir, on the frontier of Chitral, is the loftiest (25,400 feet in altitude). In this part are many passes over which trails or roads are in use. The range, which consists mainly of granites and schists, was probably uplifted in Tertiary time.

HINDU MUSIC. According to the ancient Hindu belief all arts were bestowed upon man by various gods, and music was the gift of Brahma. The early history of music in India is so beset with fables and reaches back to such remote antiquity that it is impossible to trace its real origin. We have, however, unmistakable evidence that several of the hymns of the *Rig-Veda* (about 1500 B.C.) were intended to be sung to music. The hymns also mention flutes (*vāṇa*), cymbals (*karkari*), drums (*duṇḍubhi*), and trumpets (*bakura*). Not only are the early accounts of the origin of music marked by an exuberance of the imagination, but the strictly scientific treatises on the subject of music are not free from this fault. The Hindu works on music are of uncertain date, but seem to be relatively late. Like much of Sanskrit literature, even when dealing with technical subjects, they are written in verse. They exist for the most part as yet only in manuscript. The most important are the *Samgītadarpaṇa* of Damodara, the *Samgītānārāyaṇa* by Narayana, the *Samgītātātānākara* of Sarṅgadeva (ed. by Telang, Poona, 1897), the *Rāgavibōdha* of Somanatha (ed. by Gharpure, Poona, 1895), the *Rāgamāta* of Kshemakara and many others of less value.

The oldest scale of the Hindus, the *Ṛṇāvali*, consists of only five tones, F, G, A, C, D, and is identical with that of the Chinese. In the course of time two tones were added, and A was taken as the starting point. Thus a scale identical with our A major was obtained. A scale was known as *Svaragāma*, or *Saptaka*, and the different tones were designated by the syllables *Sa*, *Ri*, *Ga*, *Ma*, *Pa*, *Dhai*, *N̄*. Each of these syllables denoted not only the fundamental tone, but was applied equally to all its chromatic alterations. Within any scale three tones were designated by special names. These were the first, third, and fifth, known as *Amśa*, *Graha*, and *Nyāsa* respectively. Their function is stated in the *Samgītānārīyaṇa*: "The note *Graha* stands at the beginning and *Nyāsa* at the end of a song. *Amśa* is the leading note; it gives to the melody its particular character and is used the most frequently, and the other notes are subordinated to it as to a ruler." The seven tones of the scale were repeated three times in succession, and thus a compass of three *Astau*, or octaves, was obtained. The different tones were classified as major tones, minor tones, and semitones. Each major tone consisted of four quarter tones, each minor of three quarters, and each semitone of two quarters. These subdivisions were called *śrutis*, of which each octave had 22. Major tones were the first, fourth, and fifth, minor tones the second and sixth, semitones the third and seventh. The *Rāgaṇibōdha* admits the possibility of no less than 960 modes, but enumerates only 36. Even out of these only 23 are recognized as having practical value. These 36 modes were divided into 6 primary called *Rāgas*, and 30 secondary modes called *Rāgaṇis*. The number of *Rāgas* was determined by the number of seasons, which in India is six. An attempt was made to have each *Rāga* express, as closely as possible, the character of the season to which it corresponded. It also was improper to play a *Rāga* at any other season than the one of which it was the expression. Musical notation by means of a staff was unknown to the Hindus. The different tones were represented by their initial consonants with lines drawn above or below to indicate to which *Astau*, or octave, the particular tone belonged. Embellishments and marks of expression were represented quite definitely by means of small circles, ellipses, chains, curves, horizontal and perpendicular lines. The end of a phrase was indicated by a lotus flower.

Of the musical instruments the *vina* (q.v.) was the principal one and is still used to-day in India. The *magudi* was also a stringed instrument with four strings. Among the varied instruments the principal ones were the *basari*, a flute with seven holes, and the *śankha*, a kind of trumpet made from a sea shell. From the perfection of the *vina* it can easily be inferred that in the art of music India was far in advance of all other Asiatic countries of antiquity. In spite of the complicated theoretical system composers employed chiefly the *śrīrāga*, our modern A major. The minor mode occurs also, but very seldom. In the religious cult of the Hindus music was of primary importance. Music, both vocal and instrumental, was strictly regulated by laws. The former was called *Gaṇa*, the latter *Vādyā*. Pantomimes were known as *Nṛtya*; and a combination of all was designated by the term *Samgīta*.

What strikes a student of the original Hindu melodies is the great discrepancy between mu-

sical theory and actual practice. Evidently the composers disregarded theoretical speculations and wrote according to the dictates of their ear; for all the melodies are found to be written exactly in our major or minor modes and can be harmonized accordingly without the least difficulty.

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HINDUSTAN, *hin'dōō-stān'*, or **HINDOOSTAN**. The land of the Hindus. A portion of India situated north of the Vindhya Mountains in the valley of the Upper Ganges. The name has been used loosely as a designation of the Indian peninsula. See **INDIA**.

HINDUSTANI (*hin'dōō-stā'nē*) **LANGUAGE AND LITERATURE**. The *lingua franca* of northern India. This is in structure an Indian language, descended from a sister dialect of the ancient Sanskrit through mediæval Prakrit vernaculars. Hindustani (Mod. Pers. *Hindūstāni*, from *Hind*, India) is divided into nearly 60 subdialects, which in the eastern portion of its district are approximate Bengali and in the south and west closely resemble Marathi and Gujarati. The territory of Hindustani, which is the vernacular of nearly 100,000,000 people, covers some 248,000 square miles. The standard dialect is the Brāj Bhāṣa, spoken in the districts of Delhi, Agra, and Mathura. Hindustani abounds in Turkish, Arabic, and Persian words, as well as in numerous borrowings from Dravidian and Kolarian dialects. In this form it is called *Urdu*, which in Turkish signifies 'camp.' This term is a relic of the Mohammedan invasions of the country around Delhi in the twelfth century, when conquerors and conquered sought to find a speech which they might each understand, and this speech became the official language of the Mogul administration, while a literary form of Urdu, used in poetry and rich in Persian elements, is known as *Rekhta*. During the nineteenth century the vocabulary of the language was purified to a great extent of the foreign element, and the usage of native words as far as possible has since been preferred. Hindustani without these non-Indian importations is called Hindi, or High Hindi.

In structure the language is analytic. In this it resembles the other modern Indian languages as well as Persian, and in many respects English. It forms cases, tenses, etc., by postpositions, periphrases, and the like. Thus, from *ghar*, 'house' (Sanskrit *grha*), is formed the genitive *ghar kā*, ablative *ghar sē*, agent case *ghar nē*, while the plural of the same cases is *gharōn kā*, *gharōn sē*, *gharōn nē*. The agent case is used for the subject of a transitive verb in a tense

derived from the past participle. There are two genders, two numbers, two voices, and nine tenses in common use, e.g., *main dekhtā*, 'I see,' *main dekhtā hūn*, 'I am seeing,' *main dekhtūgā*, 'I am going to see,' *main nē dekhtā hai*, 'I have seen' (lit. 'by me it has been seen'), and so forth. Hindi is written in the Devanagari alphabet, like Sanskrit and Marathi, while Urdu employs the Perso-Arabic script with three additional characters to represent specifically Indian sounds.

Hindustani literature is very abundant, although for the most part it rises little above mediocrity in character. It begins with the *Prithvirāj Rāsau*, by Chand Bardai (about 1200 A.D.), who related in his long poem the history of Prithviraja II, the last Hindu King of Delhi. Much of the literature consists of translations from the Sanskrit as well as from Persian and Arabic. Noteworthy specimens of this particular class of work are the *Rāmāyan* of Tulsīdās, begun 1575 A.D., and the *Būgh o Bahār* (Garden and Spring), which Ammān of Delhi translated from the Persian collection of stories called the "History of the Four Dervishes," at the beginning of the nineteenth century (Eng. trans. by Eastwick, 1851). Religious poetry, often assuming an erotic form, history, and the drama also find their place in this literature, which is the most important in modern India.

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HINGE (ME. *henge*, from *hengen*, secondary form of *hangen*, to hang). A device for attaching a door, shutter, box lid, or other swinging member, to one side or edge of an opening. It consists usually of two flaps of metal connected by a pin, or pivot, passing through one or more eyes or perforated knuckles formed on one or both flaps. Any hinge intended to be attached to the edge of the door or lid is called a *butt*; the majority of hinges are of this kind. One from which the pin is removable is a *loose-pin butt*; one in which the pin is a part of one flap, the other having a single long knuckle, is called a *loose-joint* or *lift-off hinge*. Flap hinges and strap hinges are attached to the faces of the door and jamb, or of the lid and side of a box: the common "barn-door" hinge is of this sort. Double-acting hinges have two knuckles and three flaps, allowing a door to swing in both directions through the opening, as a pantry door. Brass, bronze, iron, and steel are the metals commonly used for hinges. In mediæval work the hinges, if of the strap type, were often very ornamental, covering a considerable space with their scrolls of wrought iron. Doors which swing on pivots, like many heavy iron and bronze doors and gates and like many ancient doors and shutters of wood and even of stone (see **DOOR**), are not properly said to be hinged, but pivoted.

HINGHAM, hīng'am. A town in Plymouth Co., Mass., comprising the villages of West Hingham, South Hingham, and Hingham Centre, 17 miles by rail southeast of Boston, on Massachusetts Bay, and on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, F 3). It is purely residential and has Derby Academy, a public library, and an old meeting house which dates from 1681. The harbor here is of importance, the State having dredged, in 1911, an anchorage basin 6 feet deep and a channel 75 feet wide and 6 feet deep to connect this basin and the channel made by the Federal government, which the State widened from 50 to 75 feet. The government is administered by town meetings. Pop., 1900, 5059; 1910, 4965. Hingham was settled in 1633 and was known as Barecove until 1635, when it was incorporated under its present name. It was the home of Gen. Benjamin Lincoln, John A. Andrew, and John D. Long, and the birthplace of James Hall the eminent geologist. Consult Lincoln and others, *History of the Town of Hingham* (Cambridge, 1893), and L. C. Cornish, *Settlement of Hingham, Mass.* (Hingham, 1911).

HINK'SON, MRS. KATHARINE (maiden name TYNAN) (1861-). An Irish novelist and poet, born in Dublin. She was educated at the Dominican convent of St. Catharine of Siena at Drogheda, Ireland, and in 1893, having been married to H. A. Hinkson, she took up her residence in London. She is favorably known for her verse contained in *Louise de la Vallière and Other Poems* (1885); *Shamrocks* (1887); *Bal-lads and Lyrics* (1890); *Cuckoo Songs* (1894); *The Wind in the Trees* (1898); *Collected Poems* (1901). She also portrayed phases of Irish character in a series of pleasant novels, comprising chiefly: *A Cluster of Nuts* (1894), short tales; *The Way of a Maid* (1895); *O, What a Plague is Love* (1896); *The Handsome Brandons* (1898); *The Dear Irish Girl and She Walks in Beauty* (1899); *Three Fair Maids and A Daughter of the Fields* (1900); *The Honorable Molly* (1903); *A Book of Memory* (1906); *Peggy* (1909); *Freda* (1910); *Princess Katharine* (1911); *Honey, My Honey* (1912); *Irish Poems* (1913); *Rose of the Garden, The Romance of Lady Sarah Lennox: A Novel* (1913). Consult her *Twenty-five Years: Reminiscences* (New York, 1914). For an appreciative estimate of Mrs. Hinkson as a poet, consult *Treasury of Irish Poetry*, edited by Stopford A. Brooke and T. W. Rolleston (London, 1900), and William Archer, *Poets of the Younger Generation* (New York, 1902). Mrs. Hinkson was a conspicuous figure in the so-called Irish Literary Revival, a movement which was well under way in the nineties of the last century.

HINLICHE, ên-lê'châ, 'Southern People.' A pastoral tribe of Aracania, wandering over the southern pampas of Argentina. They live in portable tents of skins and subsist entirely upon meat derived from their herds of horses, cattle, and sheep. They are skillful artificers in leather and iron, while the women make rugs of ostrich skins and weave woolen blankets and ponchos of superior quality.

HINNA. See **HENNA**.

HIN'NOM, VALLEY OF. A ravine in or near Jerusalem (Map: Palestine, A 1). The precise location has not been determined. Scholars differ as to which of the three valleys, Kidron, Tyropæon, or Wady el Rababi, is likely to have been called the Valley of Hinnom. Jewish and Arab

tradition favor the first, which runs east of the temple elevation. A majority of recent investigators prefer the last, which is south of the present city. Much probability, however, seems to attach to the Tyropæon. In Enoch xxvi the ravine over which the author marvels is evidently the Valley of Hinnom, and it is unquestionably identical with the Tyropæon, lying between Mount Zion and the western hill. Consequently a writer familiar with Jerusalem and living towards the end of the second century B.C. located the Valley of Hinnom in the Tyropæon. The chief objections are that, if the city did not in preëxilic times extend beyond the Tyropæon, there ought to be some remains of walls there, and that, if the Tyropæon was within the city, the sacrifices of the first-born to Moloch would have been made in the immediate neighborhood of the Yahwe temple. But whatever the extent of the city, it is highly improbable that important sanctuaries were left unprotected outside the walls. That Solomon should build temples to Chemosh and Moloch, the gods of the conquered Moabitish and Ammonitish dependencies, was only natural (1 Kings xi. 7). These shrines would not be far from the royal sanctuary. When even kings like Ahaz and Manasseh offered their first-born, and questions such as those in Micah vi. 6-7 could be asked in Judah touching the expediency of making similar sacrifices to Yahwe, there is no reason to suppose that the inhabitants of Jerusalem objected to having offerings of the first-born made to Moloch near the Yahwe temple. A later addition to 1 Kings xi. 7, found in the Greek version, states that Solomon also built a temple to Ashtaroath. (See *ASTARTE*.) This is not improbable, but it may simply reflect the memory of the actual existence of such a sanctuary in the valley. The sites had probably been occupied long before Solomon by Canaanitish shrines. The name of the valley is quite obscure. Its full title seems to have been either "Valley of the Sons of Hinnom" or "Valley of the Son of Hinnom." The former is found in 2 Kings xxiii. 10 and often in the best manuscripts of the Greek version; the latter in Joshua xv. 8 and xviii. 16, where the abbreviated form "Valley of Hinnom" is also found, and in 2 Chron. xxviii. 3, xxxiii. 6; Jer. vii. 31-32, xix. 2-6, xxxiii. 35. Hinnom was regarded by the Greek translators as a proper name, and many modern authors take the same view. But as the name is changed in Jer. vii. 32, xix. 6, to "Valley of Slaughter," it probably originally suggested a pleasant meaning. It has been conjectured that the name of the divinity worshiped in the valley was *Ben Naaman* (pleasant son), which may have been a descriptive title of Tammuz (q.v.). Another explanation, necessitating no alteration of the consonantal text, is that *hinam* meant in this connection "sexual enjoyment," and that the participants in the licentious rites practiced at the shrines and in the groves of this valley were called "sons of joy." In the Babylonian Talmud (*Erubin*, 19 a) Hinnom is connected with the word *hinam* used in the sense of "levity, licentiousness." The meaning of the root is "to be jocund," and the word *hinnom* should probably be connected with it. At one of the sanctuaries in this valley children were passed through the altar fire to Moloch. It is not evident whether the phrase implies a burnt offering or an ordeal by fire. But Josiah defiled one of the chief sanctuaries,

the Taphet, later pronounced Tophet to suggest *bosheth* (shame). What basis there is for the mediæval rabbinic statement that perpetual fires were kept up in this valley for consuming dead bodies of criminals and carcasses of animals, cannot be ascertained. If Tophet was at the southern end of the Tyropæon, near Siloam, this cremation of refuse would be outside the city limits. The apocalyptic expectation in the second century of a final battle between the nations and Israel outside of the holy city seems to have rested upon this feature of the surroundings. Here the enemy would be consumed, and the pious who should go up to the temple in Jerusalem on Sabbaths and at new moons would look with satisfaction upon the carcasses consumed by fire and worms (Isa. lvi. 23-24). The same idea is found in Enoch xxvii. Gradually the term *Ge Hinnom*, or (Aramaized) *Gehenna*, came to be used, not of this valley in Jerusalem, but of the subterranean Tartarus to which it was the entrance; of the unseen place of final punishment of the impenitent; of the sudden destruction of both soul and body; or figuratively, of the inner condemnation of spiritual loss. On the geographical question, consult: Warren's article "Hinnom," in Hastings, *Dictionary of the Bible*; Conder's article "Jerusalem," in the *Encyclopædia Biblica*; G. A. Smith, *Historical Geography of the Holy Land* (7th ed., London, 1901). See *GEHENNA*; *HELL*; *JUDGMENT, FINAL*; *ESCHATOLOGY*.

HINNY (Lat. *hinna*, *hinmus*, Gk. *lynos*, or *ginnus*, Gk. *lynos*, mule from a stallion and a she-ass). The hybrid produced between a horse and a female ass. It is smaller than a mule, but the body is more bulky in proportion to the legs, and its strength is inferior. It is less valuable than the mule, although more docile. The hinny is rare. It was described by some of the earlier naturalists as a hybrid between the ox and the ass. See *MULE*.

HINOYOSSA, *hē'nō-yōs'sā*, *ALEXANDER D'*. The director of Nieuer Amstel, a Dutch colony established on the east bank of the Delaware in 1656, and afterward Governor of all the settlements on that river until the conquest of New Netherland by the English. Hinoyossa was born and died in Holland, and his activity in the Dutch settlements of America extended from 1656 to 1674. He came to New Amsterdam in 1656 as lieutenant in a small force of soldiers accompanying 150 Dutch emigrants and succeeded Jacob Aldrichs as director of Nieuer Amstel in 1659. His position was a trying one on account of the conflicts of authority which were continually disturbing the colony, especially in regard to taxation. Appeals to Holland were frequent, and Hinoyossa refused to recognize the authority of Director Stuyvesant, of New Amsterdam, who had the supervision of the commissioners composing the government of the colony. As an investment, the latter was not at first profitable, owing to sickness and dissension among its members; but Hinoyossa governed so vigorously and wisely that all attempts by the West India Company to secure control failed. Confident of his own ability and seeing the necessity of a single and undisputed authority, Hinoyossa went to Holland in 1663 to ask for the entire direction of all the Delaware settlements, which was finally given to him. Director Stuyvesant formally transferred his authority, and the Swedes, who had rival settlements there, after a fruitless effort to

resist the change, also became obedient and accepted Hinoyossa's control. On the English conquest of New Netherland Hinoyossa returned to Holland and became a soldier in the Republican army in the great war with Louis XIV. Consult J. R. Brodhead, *History of the State of New York* (2 vols., New York, 1871-74).

HINSCHIUS, hin'shi-us, PAUL (1835-98). A German jurist, known especially as an authority on ecclesiastical law. He was born in Berlin and studied jurisprudence there and at Heidelberg. In 1859 he became a lecturer on law at the University of Berlin, served as professor of law at Halle in 1863, returned to Berlin in 1865, and in 1868 was appointed professor at the University of Kiel, which he represented in the Prussian House of Lords. In 1872 he became professor of ecclesiastical law at Berlin and subsequently took part in the Kulturkampf (q.v.). He served in the Reichstag in 1872-78 and 1881-82 and represented the University of Berlin in the Prussian Upper House after 1889. His fame rests mainly on the *Decretales Pseudo-Isidorianæ et Capitula Angilramni* (2 parts, 1863) and on the incomplete but especially important *Das Kirchenrecht der Katholiken und Protestanten in Deutschland* (6 vols., 1869-77).

HINSDALE, hinz'däl, BURKE AARON (1837-1900). An American educator. He was born in Ohio and was educated at the Western Reserve Eclectic Institute (now Hiram College), where he was a pupil of James A. Garfield. In 1861 he entered the Campbellite ministry, preaching in Cleveland and other places, and in 1866 was chosen assistant editor of the *Christian Standard*. Three years later he became professor of history and English literature in Hiram College and from 1870 to 1882 was its president. After a few years' service as superintendent of schools at Cleveland, Ohio, he was appointed professor of the science and art of teaching in the University of Michigan in 1886. Among his publications are: *Genuineness and Authenticity of the Gospels* (1870); *The Republican Text-Book* (1880); *Garfield and Education* (1881); *The Old Northwest* (1888); *How to Study and Teach History* (1894); *Teaching the Language Arts* (1896); *Horace Mann and the Common-School Revival in the United States* (1898); *American Government, National and State* (4th ed., 1905). He also edited the *Life and Works of James A. Garfield* (2 vols., 1882-83).

HINTERLAND, hin'tér-lánt (Ger., back territory). A term that came into general use at the time of the partition of East Africa between Germany and England in 1890. The doctrine of the hinterland is the claim of German diplomats that, when a power takes possession of a strip of seacoast, its rights extend inland indefinitely, or until its territory reaches the recognized boundary of some other power.

HINTON. A city and the county seat of Summers Co., W. Va., 97 miles southeast of Charleston, on the New River, and on the Chesapeake and Ohio Railroad (Map: West Virginia, D 4). It is a railroad division headquarters with repair shops, and has two hospitals, a high school, and a Carnegie library. Pop., 1900, 3763; 1910, 3656.

HINTON, ARTHUR (1869-). An English composer, born at Beckenham, Kent. He completed a three-year course at the Royal Academy of Music in London under Sauret (violin) and Davenport (composition) and was then

appointed teacher of violin. Having held this position for three years, he went to Munich for a further course in composition under Rheinberger. Here his first symphony, in B flat, was produced under his own direction. After some time spent in Vienna and Rome he returned to London in 1896, where he filled various positions as conductor of theatre orchestras. In 1903 he married the pianist Katharine Goodson (q.v.). His works include two symphonies (the second in C minor); an orchestral fantasy, *The Triumph of Cæsar*; two scenes from *Endymion*; a violin sonata in B flat; a trio in D minor; a piano quintet in G minor; the opera *Tamara*; and the very successful children's operas *The Disagreeable Princess* and *St. Elizabeth's Rose*.

HINTON, JAMES (1822-75). An English surgeon and philosophical writer, born at Reading. He was educated at the hospital of St. Bartholomew and began the practice of surgery in London about 1850 as an ear specialist. Besides lecturing upon his chosen subject in Guy's Hospital, from 1862 to 1874, he published: *Man and his Dwelling-Place* (1859); *Life in Nature* (1862); *The Mystery of Pain* (1865). Two of his books upon similar subjects were issued posthumously. Ellice Hopkins edited his *Life and Letters* (1878).

HINZPETER, hints'pät'er, GEORG ERNST (1827-1907). A German educator, born at Bielefeld, where he taught after his university course at Halle and Berlin (1847-50). The Crown Prince's tutor, Hinzpeter became Privy Councillor and member of several governmental boards after Wilhelm II came to the throne. He strongly influenced the Emperor's educational policy and in 1890 was prominent in the Berlin Conference on Higher Education. He wrote *Kaiser Wilhelm II.* (9th ed., 1889). In 1908 the Emperor contributed towards the monument erected to Hinzpeter.

HIOGO, hyô'gô, or **FIOGO**. A part of the Japanese town of Kôbé (q.v.).

HIONG-NU, hyông'noo'. By this name (also spelt Hun-yü, Hien-yün, Kün, and Hiung-nu) the Chinese chroniclers designate a people of Turkish or Tatar race who, some two centuries B.C., founded a powerful kingdom in Central Asia, conquered Turkestan, and made inroads into China. The kingdom of the Hiong-nu lasted until the middle of the first century A.D., when it split into two sections, of which the northern soon disappeared from history. Early Chinese chronicles are filled with accounts of conflicts with this race. Some identify the Huns with the Hiong-nu. The Chinese account of this people was published (in translation) in the *Journal of the Anthropological Institute* (London, 1874). Many ethnologists see in the Hiong-nu the ancestors of the Turks. Consult Hirth, *The Ancient History of China* (New York, 1911).

HIOUEN-THSANG, hê-wên-tsäng', or **YUAN CHWANG**. A celebrated Chinese Buddhist traveler, who visited 110 places of India in the first half of the seventh century (629-645) and gave an account of the condition of Buddhism at that period in India. He was born in 600 in the Province of Honan. He was a precocious youth, loved learning, and was very fond of the Confucian work on Filial Piety. At the age of 20 he was ordained as a Buddhist monk and soon became famous for his learning and eloquence. His longing to visit the holy land of Buddhism set him on his travels. After an absence of 16 years he returned, bringing

with him 657 sacred Buddhist books and 150 relics of Buddha. He received a great ovation from Emperor, court, and people, and was held in the highest honor. As to the accounts of his travels, his interests being chiefly religious, he did not enter much into details concerning the social and political condition of India. His narrative, however, gives many curious facts which he observed and, possessing a high degree of trustworthiness, is one of the most important documents for the history of India at that time. Apparently he traveled alone or with a few occasional companions and wore the garb of a religious mendicant. It does not appear that the account of his travels was written by himself. The first of the two works relating to them is a biographical notice of him, in which his travels form a principal feature; it was composed by two of his pupils, Hoei-li and Yen-thsong. The latter bears the title of *Ta-thang-si-yu-ki*, or "Memoirs of the Countries of the West," published under the Thang," and was edited by Pien-ki. Both works have been translated by Julien in his *Histoire de la vie de Hiuen-Tsang* (1853) and his *Mémoires sur les contrées occidentales, par Hiuen-Tsang* (1857-58). Consult: *Buddhist Records of the Western World* (2 vols., Boston, 1885); Samuel Beal, *Life of Hiuen-Tsang* (London, 1888); Thomas Watters, *On Yuan Chwang's Travels in India* (2 vols., ib., 1904-05); G. A. Grierson, "Yuan Chwang's Mo-la-p'o," in *Journal of the Royal Asiatic Society* (1906).

HIP JOINT. A ball-and-socket joint, formed by the reception of the globular head of the thigh bone (or femur) into the deep pit or cup in the *os innominatum*, which is known as the *acetabulum* (so called from its resemblance to the vinegar cups used by the Romans). If the variety of the movements of this joint—viz., flexion, extension, abduction, adduction, and rotation inward and outward—and at the same time its great strength are considered, it may well claim to be regarded as the most perfect joint in the whole body.

The ligaments are usually described as five in number: (1) the capsular; (2) the ilio-femoral; (3) the teres, or round; (4) the cotyloid; and (5) the transverse. The capsular ligament extends from the edge of the cup to the circumference of the neck upon which the ball is carried, inclosing the bony parts in a strong sheath. The ilio-femoral, or Y, ligament is merely an accessory band of fibres which give increased thickness to the capsular ligament in front, where strength is specially required. The great use of the capsular ligament is to limit the extension of the hip joint and thus to give steadiness to the erect posture. The only other ligament of importance is the teres, or round, ligament, which is in reality triangular rather than round and has its apex attached to the head of the thigh bone, while its base is connected with the cavity of the acetabulum. Its use is not very clearly known, but probably is to support and protect vessels giving blood supply to the head of the bone. It is sometimes absent in cases in which no special weakness of the joint was observed during life and is of by no means constant occurrence in mammals. The joint is much strengthened by a large number of surrounding muscles, some of which are of considerable power.

In such a joint as this, although the ligaments materially assist in preventing dislocation, it is

obvious that the articular surfaces cannot, under ordinary circumstances, be kept in apposition by them, inasmuch as they must be loose in their whole circumference, to permit of the general movements of the joint. The experiments of Weber have shown that atmospheric pressure is the real power by which the head of the femur is retained in the acetabulum when the muscles are at rest. In spite of its anatomical reinforcements the hip joint is often dislocated. The head of the femur may be forced from its socket downward, forward, or backward, each position producing its characteristic symptoms and deformity.

Disease of the Hip Joint. Hip disease differs in so many points of importance from other joint diseases and is so serious an affection that it requires a special notice. Its connection with the scrofulous or strumous diathesis is more distinctly marked than that of most other joint diseases, and it almost always occurs before the age of puberty. It is essentially a tubercular inflammation of the hip joint. Its beginning may be often associated with some trivial occurrence, such as overexertion in a long walk, a sprain in jumping, or a fall.

In the early stage of the disease the whole of the structures of the joint are inflamed, and by proper treatment at this period the morbid action may be sometimes subdued without any worse consequences than a more or less rigid joint. Usually, however, abscesses form around the joint and often communicate with its interior; and the acetabulum, and the head and neck of the thigh bone, become disintegrated, softened, and roughened. In a still more advanced stage dislocation of the head of the thigh bone commonly occurs, either from the capsular ligaments becoming more or less destroyed, and the head of the bone being drawn out of its cavity by the action of the surrounding muscles, or from a fungous mass sprouting up from the bottom of the cavity and pushing the head of the bone before it. It is of extreme importance that the symptoms should be detected in an early stage of the disease, and surgical aid at once be sought.

As the disease advances, abscesses, as already mentioned, occur around the joint, which sometimes, from the tension they exert on the obturator nerve, occasion extreme pain in the inside of the thigh. True shortening of the limb now takes place, which at the same time becomes adducted and inverted. From this stage, if the general health is good, the patient may be so fortunate as to recover with an ankylosed (or immovable) hip joint; but occasionally a condition of exhaustion comes on, the tubercular process exhibits itself in the lungs and elsewhere, and death finally supervenes from the prolonged septic processes. The duration of the disease may vary from two or three months to 10 or more years. The essential factor in the treatment of these cases is complete immobilization of the joint for a protracted period by means of plaster splints or rigid metal braces. With this must be combined nourishing food, fresh air, and sunlight, with general exercise of the body as early as is practicable.

HIPKINS, ALFRED JAMES (1826-1903). An English connoisseur of musical instruments, born at Westminster. Having entered in 1840 the piano firm of Broadwood and Sons, with which he remained till his death, he made himself master of all the details of technical con-

struction and also turned his attention to the history of the piano. This led him further to a study of all related keyboard instruments, and this, in turn, to the investigation of temperament and pitch. At the same time he made himself an excellent performer on the piano as well as on all the older instruments. Beginning with the Great Exhibition of 1851, he served as expert or juror in connection with almost every important exhibition held in England since then. He participated in the exhibitions in Vienna (1892) and Paris (1900). His principal writings are: *Old Keyboard Instruments* (1887); *Musical Instruments, Historical, Rare, and Unique* (1888); *A Description and History of the Pianoforte and Older Keyboard Stringed Instruments* (1896). Besides, he wrote all the articles relating to his subject for the ninth edition of the *Encyclopædia Britannica* and for *Grove's Dictionary of Music and Musicians*.

HIPPARCHUS, hîp-pär'kûs (Lat., from Gk. Ἱππαρχος) (flourished between 161 and 126 B.C.). A Greek astronomer and mathematician. He was born in Nicæa, Bithynia, but his astronomical work was done on the island of Rhodes and possibly also in Alexandria. Of his personal history nothing is known. He was the founder of genuinely scientific astronomy and also of a part of that science which lies on the borderland of astronomy and geometry, viz., trigonometry. In this field he computed a table of chords which, although lost, is known to us through the works of Theon of Alexandria (q.v.), who wrote about 365 A.D. It is probable, too, that this is the Hipparchus who wrote on combinatory analysis, and that the Arabs were correct in attributing to him a knowledge of the quadratic equation. Certain it is that Ptolemy was indebted to him for much of the *Almagest* (q.v.). According to Fabricius, Hipparchus wrote nine separate works; but of these only the *Commentaries on the Phenomena of Aratus and Eudoxus* has come down to us. The text of these *Commentaries* was edited by Manitius and published, with a German translation, at Leipzig in 1894. From the *Almagest* we learn that it was Hipparchus who first discovered the precession of the equinoxes, determined the place of the equinox among the stars, invented solar and lunar theories, invented the astrolabe (q.v.), determined longitude by means of lunar eclipses, and drew up a catalogue of 1080 stars, determining the longitude and latitude of each (this catalogue has been preserved in the *Almagest*). As Ptolemy was also an astronomer, there is some difficulty in allotting to each his meed of praise for the discoveries mentioned in the *Almagest*, which difficulty has given rise to some discussion. Consult: J. B. J. Delambre, *Histoire de l'Astronomie ancienne* (Paris, 1817); Robert Grant, *History of Physical Astronomy* (London, 1852); Lewis, *Historical Survey of the Astronomy of the Ancients* (ib., 1862); Hugo Berger, *Die geographischen Fragmente des Hipparch* (Leipzig, 1870); Rudolf Wolf, *Geschichte der Astronomie* (Munich, 1877); Paul Tannery, *Recherches sur l'histoire de l'Astronomie ancienne* (Paris, 1893).

HIPPARCHUS (c.555-514 B.C.). The son and one of the successors of Pisistratus (q.v.), tyrant of Athens. On the death of Pisistratus (527 B.C.) Hipparchus and his older brother, Hippias, kept the government of Athens in their hands. Hipparchus interested himself in art and literature, as his father had done. He was mur-

dered by Harmodius and Aristogiton (q.v.), in 514, at the Panathenæa, probably in revenge for a personal insult, though the Greeks of the next century commonly considered the murderers as patriots and saviors of their country. See **HIPPIAS**.

HIPPARION (Neo-Lat., from Gk. ἵππιον, pony, dim. of ἵππος, *hippos*, horse). A fossil horse, somewhat smaller than the Asiatic ass, remains of which have been found in Upper Miocene rocks of North America and in the Pliocene deposits of North Africa, Asia, and Europe.

HIPPEASTRUM, or **LILY OF THE PALACE**. See Plate of **AMARYLLIDACEÆ**.

HIPPEL, THEODOR GOTTLIEB VON (1741-96). A German humorist and satirist, born at Königsberg. After traveling in Russia he settled in his birthplace, first as tutor and then as zealous student of law, and in 1786 became Privy Councillor of War and president of the town. He was a strange man, full of inconsistencies. He published, all anonymously, *Ueber die Ehe* (1774, ed. by Brenning, 1872); *Ueber die bürgerliche Verbesserung der Weiber* (1792); *Lebensläufe nach aufsteigender Linie, nebst Beilagen A. B. C.* (1778-81, ed. by Oettingen, 1883), his most important work; and *Ueber weibliche Bildung* (1801). In these works he attempted to express and popularize the philosophy of Kant's *Kritik*, then unpublished. Of a more satiric and political nature are: *Zimmermann I. und Friedrich II., von Johann Heinrich Friedrich Quittenbaum Bildschnitzer in Hannover* (1790) and *Kreuz und Querzüge des Ritters A bis Z*. His other works include some hymns, the idyllic *Handzeichnungen nach der Natur* (1790); the drama *Der Mann nach der Uhr* (2d ed., 1771); and *Ueber das Königsberger Stapelrecht* (1791). His collected works were published at Berlin in 14 volumes (1827-38). Consult his autobiography (Gotha, 1801); M. von Hippel, *Die Geschichte der Familie von Hippel* (Leipzig, 1899); Johann Czerny, *Sterne, Hippel, und Jean Paul* (Berlin, 1904).

HIPPIAS, hîp'î-ās (Lat., from Gk. Ἱππίας) (?-c.490 B.C.). A tyrant of Athens, son of Pisistratus (q.v.), upon whose death (527 B.C.) he assumed the government in conjunction with his brother Hipparchus (q.v.). According to Thucydides, the government of the brothers was conducted on the same principle as that of their father, and many distinguished poets, including Simonides of Ceos and Anacreon of Teos, lived at Athens under their patronage. After the assassination of Hipparchus, in 514 B.C., Hippias governed alone and avenged the death of his brother by imposing extraordinary taxes, selling offices, and putting to death all of whom he entertained the least suspicion. At length, however, his despotism was overthrown. The Delphic oracle was bribed to enjoin the Lacedæmonians to free Athens from the Pisistratidæ, and after one or two unsuccessful attempts the tyrant's old enemies, the Alcæonidæ (q.v.), to whom Megacles belonged, supported by a Spartan force under Cleomenes, defeated Hippias in the field, captured his children, and compelled him and all his relatives to leave Attica (510 B.C.). As soon as they had departed, a decree was passed condemning the tyrant and his family to perpetual banishment, and a monument commemorative of their crimes and oppression was erected in the Acropolis. After spending some time at Sigeum, Hippias went to the court of Darius and

incited the first war of the Persians against the European Greeks. He accompanied the expedition sent under Datis and Artaphernes and persuaded the Persians to land at Marathon. It cannot be determined whether he was killed during the battle or whether he died at Lemnos on his return.

HIPPIAS OF ELIS (c.460-? B.C.). A Greek mathematician, writer, diplomat, and philosopher. He was a teacher of renown, a man of great pretense, but a scholar of little originality. His teaching, for which his pupils were compelled to pay heavily, was directed to the practical end of success in a worldly way, to display, and to ability in public address. It is probable that he is the Hippias mentioned by Proclus (on the authority of Geminus) as the inventor of the quadratrix—a curve originally designed, it is thought, for dividing an arc in a given ratio, but which also lends itself readily to the quadrature of the circle. (See QUADRATURE.) This curve, however, usually bears the name of Dinostratus, since he studied it with so much care.

HIPPID/TUM. An extinct ancestor of the horse. See HORSE, FOSSIL.

HIP'PO (Lat., from Gk. ἵππον, *Hippōn*), or **HIPPO REGIUS**. A Phœnician colony in north Africa, later a favorite residence of Masinissa, King of Numidia, of which the scanty ruins are yet to be seen near Bona (Bone), Algeria. Hippo was a flourishing trading city under the Roman rule and in later years the see of St. Augustine, who died here in 430 A.D., just before the destruction of the city by the Vandals.

HIP'POBOS/CIDÆ (Neo-Lat. nom. pl., from Gk. ἵπποβοσκός, *hippoboskos*, feeding horses, feeding on horses, from ἵππος, *hippos*, horse + βόσκειν, *boskein*, to feed). A strange and important family of dipterous insects which are parasitic upon birds and mammals and which are popularly known by the name of bird ticks. This is misleading, since they are not ticks, and are not confined to birds, although the adults live and move quickly about among the feathers and hair of birds and mammals. Unlike most other external parasites of the higher animals, many of them possess wings, although they are otherwise modified as the result of their parasitic life. Their development is very abnormal and differs from that of all other insects. The eggs hatch and the larvæ develop within the mother and are extruded only after they have become pupæ. *Hippobosca equina* is a winged species which occurs on the horse and is known in England as the forest fly. *Melophagus ovinus* is a wingless form and occurs on the sheep. One of the commonest of the North American species is *Olfersia americana*, which is found upon certain birds, like the horned owl, certain hawks, and the ruffed grouse. The species of the genus *Lipoptena* may, while still winged, live on birds, but afterward they lose their wings and are then found on mammals.

HIP'POCAM'PUS. See SEA HORSE.

HIP'POCRAS (from Fr. *hippocras*, *hypocras*, from Lat. *Hippocrates*, Gk. Ἱπποκράτης, *Hippokratēs*, a famous Greek physician). An aromatic medicated cordial, formerly much used in Great Britain. It was made of spiced wine, mixed with sugar, lemon, aromatic tincture, or other ingredients.

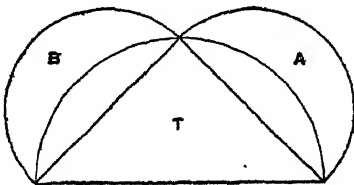
HIPPOCRATES (Lat., from Gk. Ἱπποκράτης, *Hippokratēs*) (c.460-357 B.C.). A Greek physician, the most celebrated of antiquity and justly

called "the father of medicine." He was the son of Heraclides, also a physician, and belonged to the family of the Asclepiadæ, being either the nineteenth or seventeenth in descent from Æsculapius. His mother, Phænarete, was said to be descended from Hercules. He was born in the island of Cos. He is said to have been instructed in medicine by his father and by Herodicus, and in philosophy by Georgias of Leontini, the sophist, and Democritus of Abdera, whom he afterward cured of insanity. After spending some time in traveling through different parts of Greece, he settled and practiced his profession at Cos and finally died at Larissa in Thessaly. He is said to have passed the age of 100. We know little more of his personal history than that he was highly esteemed as a physician and an author, and that he raised the medical school of Cos to a very high reputation. His works were studied and quoted by Plato. Various stories are recorded of him by Greek writers, which are undoubtedly fabulous; and legends regarding him are found in the works of Arabic writers, who term him Bukrat, while the European story-tellers of the Middle Ages celebrate him under the name of Ypocras. The works bearing the name of Hippocrates, and termed the Hippocratic collection, are 72 in number and include many treatises by his sons Thessalus and Draco, by his son-in-law Polybus, and by others. The following are considered authentic: *Epidemics*; *Regimen in Acute Diseases*; *On Air, Water, and Places*; *On Wounds of the Head*; parts of the *Aphorisms* and parts of the *Prognostics*; the work on *Ancient Medicines*; *Joints*; *Fractures*; *The Use of the Lever*; *Laws*; *Ulcers*; *Hæmorrhoids*; *The Sacred Disease*; *Fistulæ*; and *On the Duty of the Physician*, as well as the *Oath*. Hippocrates divides the causes of disease into two principal classes—the first consisting of the influence of seasons, climates, water, situation, etc., and the second of more personal causes, such as the food and exercise of the individual patient. His belief in the influence which different climates exert on the human constitution is very strongly expressed. He ascribes to this influence both the conformation of the body and the disposition of the mind and thus accounts for the difference between the Greek and the Asiatic. The four fluids, or humors, of the body (blood, phlegm, yellow bile, and black bile) were regarded by him as the primary seats of disease; health was the result of the due combination (or *crasis*) of these, and illness was the consequence of a disturbance of this *crasis*. When a disease was proceeding favorably, these humors underwent a certain change (or *cocction*), which was the sign of returning health, as preparing the way for the expulsion of morbid matter, or *crisis*, these crises having a tendency to occur at definite periods, which were hence called "critical days." His treatment of diseases was cautious and what we now term expectant; it consisted chiefly in attention to diet and regimen. Thus, he was the inventor of the humoral pathology, so long in vogue in medical schools. He must be judged by the standards of his day. A most careful and keen observer and exact chronicler of symptoms, he was also the possessor of a remarkable mental equipment and a man of great nobility and morality. See HIPPOCRATIC OATH.

The works of Hippocrates were translated at an early period into Arabic. They were first printed in a Latin translation in 1525 at Rome,

Galen's commentaries on his works being of special value. The first Greek edition (the Aldine) appeared the following year at Venice; an edition by Mercurialis appeared in 1588, one by Foesius in 1595, and one by Van der Linden (still much esteemed) in 1665. An edition under the editorship of Kuhn appeared in three volumes at Leipzig in 1825-27. The best French edition is that of Littré, in 10 volumes, the first of which appeared in 1839 and the last in 1861. An excellent English translation of *The Genuine Works of Hippocrates* was published in 1849 in two volumes by Dr. Adams.

HIPPOCRATES OF CHIOS, κῤῥῶς (c.450 B.C.). A Greek geometer, possibly related to the family of the celebrated physician. His early life was devoted to maritime commerce, and the seizure of a vessel by the Athenian customs called him (c.430) to Athens to obtain redress. Failing in his mission, he betook himself to the study of philosophy and to teaching geometry. He wrote the first elementary textbook on geometry, and his name is often connected with the quadrature of certain figures which are com-



LUNES OF HIPPOCRATES.

monly called the lunes of Hippocrates. The theorem is not found in the works of Hippocrates; but Pardies, in his *Elémens de géométrie* (1671), assigns it to him, and most subsequent writers have done the same without stopping to confirm the statement. Simplicius quotes Eudemus as saying that Hippocrates first showed that similar segments of circles are proportioned to the squares of their bases, and the proposition regarding them can easily be deduced from it. In its simplest form the proposition asserts that if semicircles be described upon the three sides of an isosceles triangle, as shown in the accompanying figure, the area of the triangle equals the sum of the areas of the lunes—i.e., $T = A + B = 2A$. It is easily proved that $T = A + B$ even if the triangle is not isosceles. These propositions on the lunes are further interesting as being the oldest extant specimens of geometric proofs by reasoning.

Hippocrates attempted the problem of duplicating the cube and reduced it to that of finding two means between one line and another of double its length. He is also credited by Proclus with inventing the process of geometric reduction, consisting in passing from one proposition to another, which being mastered, the one proposed necessarily follows. Consult Paul Tannery, "Hippocrate de Chios et la quadrature des lunes," in the *Mémoires de Bordeaux* (Bordeaux, 1878).

HIPPOCRATIC OATH. An oath taken by young men in the early days on entering upon the practice of medicine. In ancient times the oath was ascribed to Hippocrates and is probably authentic. It runs as follows: "I swear by Apollo, the physician, by Æsculapius, by Hygieia, Panacea, and all the gods and goddesses, that according to my ability and judgment I

will keep this oath and stipulation: to reckon him who teaches me this art equally dear with my parents; to share my substance with him and to relieve his necessities if required; to look upon his offspring upon the same footing as my own brothers; and to teach them this art if they shall wish to learn it, without fee or stipulation; and that by precept, lecture, and by every other mode of instruction I will impart a knowledge of this art to my own sons, to those of my teachers, and to disciples bound by a stipulation and oath, according to the law of medicine, but to no others. I will follow that system of regimen which, according to my best judgment, I consider best for my patients and abstain from whatever is injurious. I will give no deadly medicine to any one if asked nor suggest any such counsel. Furthermore, I will not give to a woman an instrument to procure abortion. With purity and holiness will I pass my life and practice my art. I will not cut a person who is suffering with stone, but will leave this to be done by those who are practitioners of such work. Into whatever houses I enter I will go for the advantage of the sick and will abstain from every voluntary act of mischief and corruption, and, further, from the seduction of females or males, bond or free. Whatever in connection with my professional practice, or not in connection with it, I may see or hear, I will not divulge, holding that all such things should be kept secret. While I continue to keep this oath inviolate, may it be granted to me to enjoy life and the practice of my art, respected always by all men; but should I break through and violate this oath, may the reverse be my lot." It is said that a similar oath was used in the Middle Ages, after the discontinuance of the use of the Hippocratic oath. Some medical colleges of to-day impose a simpler obligation in the form of an admonition and an affirmation, to which the graduating class assents.

HIPPOCRENE, hîp'pō-kre'nē (Lat., from Gk. ἵπποκρήνη, *Hippokrenē*, horse spring, from ἵππος, *hippos*, horse + κρήνη, *krēnē*, spring). A fountain on Mount Helicon (q.v.), about 20 stadia above the Grove of the Muses, and, according to the mythical account, produced by a stroke from the hoof of the horse Pegasus (q.v.). It was sacred to the Muses. It is probably to be identified with the *Kryopēgadi* (cold spring), on the north side of the southeast (and highest) peak of Mount Helicon.

HIPPODAMIA, hîp'pō-dā-mī'ā (Lat., from Gk. Ἴπποδάμεια). 1. Daughter of Enomaus (q.v.), King of Pisa in Elis, and Sterope, one of the Pleiades. As an oracle had declared that Enomaus should be killed by his son-in-law, the King required that each suitor should engage with him in a chariot race, from Pisa (Olympia) to the altar of Poseidon at Corinth. The suitor, with Hippodamia in his chariot, was allowed as a handicap so much time as Enomaus needed for a sacrifice to Poseidon. As his horses were a gift of the god, the King always caught the luckless suitor, whom he slew in passing with his spear, until Pelops (q.v.) bribed Mytilus, the King's charioteer, to weaken the linchpin, and Enomaus was dragged to death by his own horses. After his victory Pelops threw Mytilus into the sea and was cursed by the drowning man for his faithlessness. Hippodamia became the wife of Pelops and the mother of Atreus and Thyestes. She afterward induced them to murder their half brother, Chrysippus, and then

fled to Midea in Argolis, where she died. Her body was brought by Pelops to Olympia and interred in the sacred inclosure of the Altis, where she was worshiped in later times. The preparations for the chariot race formed the subject of the sculptures in the east pediment of the great temple at Olympia. (Consult Karl Baedeker, *Greece*, pp. 304-305, 4th Eng. ed., Leipzig, 1909.) Hippodamia appears not infrequently on vases. 2. The wife of Pirithous, at whose wedding occurred the conflict between the Centaurs and Lapithæ (q.v.).

HIPPODAMUS, hip-pōd'a-mūs (Lat., from Gk. Ἰππόδαμος), OF MILETUS. A Greek architect of the fifth century B.C., famed as the first to lay out cities with broad, straight streets intersecting at right angles. At the invitation of Pericles he laid out the Piræus (q.v.). He went as architect with the colonists to Thurii (q.v.). In 408 B.C. he laid out the town of Rhodes. Consult F. J. Haverfield, *Ancient Town-Planning* (Oxford, 1913).

HIPPO DI'ARRHY'TUS. See BIZERTA.

HIPPODROME (Lat. *hippodromus*, from Gk. ἵπποδρόμος, horse-race course, from ἵππος, *hippos*, horse + δρόμος, *dromos*, running, course, from δραπεῖν, *dramein*, to run). The Greek name for the place set apart for horse and chariot races. The dimensions seem to have varied at different places. Frequently the hippodrome was but a level space, fitted out at the actual time of the races with proper turning posts. The dimensions of the hippodrome at Olympia, which was larger and far more elaborate than the ordinary hippodrome, have recently come to light in a Greek manuscript found in the old Seraglio in Constantinople. The total circuit was 8 stadia (about 0.95 mile), but the length of the actual race course was only 6 stadia. The breadth was about 320 feet. It is also said that pairs of colts made three circuits, pairs of grown horses or four colts made eight rounds, and the four-horse chariots twelve. Riding races consisted of but one lap (6 stadia). From about 500 to 444 B.C. there was a mule chariot race at Olympia. As the figures given above make the four-horse chariot race cover about 8½ miles, some modern scholars believe that not the circuit, but merely the length of the hippodrome, is meant, and that therefore the length of the contests should be reduced one-half. A race of over 8 miles must have been a contest of endurance rather than of speed. At Olympia the starting was effected by means of the *aphesis*, a system of stalls arranged along the two sides of a triangle, the apex of which was to the right of the centre line, and apparently so arranged that the distances from the turning point to the angles at the base of the triangle were equal; a rope was stretched before each chariot. The start was effected by setting free the chariots on the extreme right and left, nearest the base of the triangle, and when they came abreast of the next two, by setting them free also, and so on till all were in motion. The total number of starters seems at times to have been very large, as Pindar speaks of 41 chariots as competing at the Pythian games, and Alcibiades alone sent seven chariots to Olympia; hence each side of the *aphesis* was 400 feet long. The *aphesis* does not seem to have been used elsewhere. The golden age of the hippodrome was during the Byzantine Empire. The blue and green factions in the hippodrome carried their animosity into all departments of the public service, and the Nika riots in Constantinople

threatened to dethrone Justinian. The site of the great hippodrome at Constantinople is still called Atmeidan (the horse place) by the Turks, and the line of the central barrier is marked by the obelisk of Theodosius, the bronze serpents that supported the Platean tripod, and the column erected by Constantine VII. Consult: G. H. A. Lehndorff, *Hippodromos* (Berlin, 1876); Ervinus Pollack, *Hippodromica* (Leipzig, 1890); William Smith, *A Dictionary of Greek and Roman Antiquities*, vol. i (3d ed., London, 1890); Wernicke and Schöne, in *Jahrbuch des archäologischen Instituts*, ix (Berlin, 1894) and xii (ib., 1897); the elaborate article by A. Martin, "Hippodromos," in Daremberg and Saglio, *Dictionnaire des antiquités* (Paris, 1897); E. N. Gardiner, *Greek Athletic Sports and Festivals* (London, 1910).

HIPPOGRYFF, or **HIPPOGRYPH** (from Fr. *hippogriffe*, Gk. ἵππος, *hippos*, horse + Lat. *gryphus*, griffin, from Gk. γρύψ, *gryps*, from γρυπός, *grypos*, hook-nosed). A fabulous animal, represented as a winged horse, with the head of a griffin, invented, probably in imitation of Pegasus, by the romancers of the Middle Ages for the purpose of transporting their heroes through the air.

HIPPOLITA. The Queen of the Amazons and the betrothed of Theseus, in Shakespeare's *Midsummer Night's Dream*.

HIPPOLYTA. See AMAZONS; HERCULES.

HIPPOLYTUS (Lat., from Gk. Ἴππόλυτος). In Greek legend, the son of Theseus (q.v.) and the Amazon Antiope, or Hippolyte, a mighty hunter and devoted servant of Artemis, but a despiser of Aphrodite, who wreaked a terrible vengeance on him. Brought up in Troezen, he was first seen by his stepmother Phædra when he was a young man. She fell in love with him and, when he repulsed her advances, committed suicide, leaving a letter to Theseus accusing Hippolytus of an attempt upon her virtue. (Of the similar stories told of BELLEROPHON and PELEUS.) Theseus cursed Hippolytus and drove him from home and besought his father, Poseidon, to avenge him. Poseidon sent a sea monster, who frightened the horses of Hippolytus, as he was driving along the shore near Troezen, so that they ran away and dragged him to his death. Hippolytus was worshiped at Troezen. One version of the Hippolytus story told how Artemis persuaded Asclepius to restore her favorite to life, and this led the Romans to identify him with the deity Virbius of Aricia. The story of Hippolytus is best known to us through the *Hippolytus* of Euripides (the extant *Hippolytus* is the later of two plays on the subject by Euripides), which has been imitated by Seneca in his *Hippolytus* and by Racine in his *Phèdre*. Consult: Euripides, *Hippolytos*, edited by Wilamowitz-Möllendorf (Berlin, 1891), and Harry (Boston, 1899); Kalkmann, *De Hippolytis Euripideis* (Bonn, 1882). On the numerous representations, especially on sarcophagi, consult: August Kalkmann, "Ueber Darstellungen der Hippolytos-Sage," in the *Archäologische Zeitung*, xli (Berlin, 1883); Karl Robert, *Antike Sarkophagreliefs*, ii (ib., 1902); J. E. Harry, Introduction to his edition, pp. xxxviii-xlv. For interpretation of the myth, consult Harry, pp. xxxiv-xxxvii.

HIPPOLYTUS. The name of several saints and martyrs of the early Church, of whom the most interesting flourished in the early part of the third century. Although a very prominent

man in his day, the known facts of his life are few. He was of Greek ancestry and possibly born in Rome, became a presbyter of Rome under Bishop Zephyrinus (199-217?), and attracted attention by his great learning. He headed a party in opposition to Zephyrinus and especially to his successor Calixtus, and was chosen by it their Bishop. But as his opposition was probably mostly personal and on questions of policy, when Urban I succeeded Calixtus, he was reconciled with the Roman church. However, in 235 he went into exile in Sardinia with Pontianus, Urban's successor, and died there. The bodies of both were brought back to Rome for burial. He is a saint in the Roman calendar, and his day is August 13. He was a voluminous author, but his works are now known only by fragments. Of these the most interesting is the so-called *Philosophoumena*, formerly attributed to Origen, but now thought to be the first book of a work by Hippolytus, *The Refutation of All the Heresies*. A manuscript giving books iv-x, previously unknown, was discovered at Mount Athos in 1842. In them Hippolytus gave details which threw new light upon his life. This manuscript was first printed in its entirety by Emmanuel Miller (Oxford, 1851), who, however, attributed it to Origen. Baron Bunsen was the first (1852) to assign it to Hippolytus. Hippolytus' works are given in Migne, *Patrol. Græca*, x, and much better by Bonwetsch and Archelais (Leipzig, 1897 et seq.); they are translated in *Ante-Nicene Fathers*, v. Consult: C. K. J. Bunsen, *Hippolytus and his Age* (London, 1852); Hans Achelis, "Hippolytstudien," in *Texte und Untersuchungen* (Leipzig, 1897); K. J. Neumann, *Hippolytus von Rom in seiner Stellung zu Staat und Welt* (ib., 1901); A. d'Ales, *La théologie de Saint Hippolyte* (Paris, 1906).

HIPPOLYTUS, CANONS OF. A book of ecclesiastical instructions, written in Greek, but now known in an Arabic version from a Coptic translation, which ascribes it to "Hippolytus, chief of the bishops of Rome." While this authorship is doubtful, the book probably belongs to the third century and may have taken its present form in Egypt. It is connected with a group of works whose nucleus is the *Egyptian Church Order*. This book exists in Coptic and Ethiopic and is expanded in the Syriac *Testament of the Lord* and in the *Apostolic Constitutions*, a compilation from about the end of the fourth century. The *Canons of Hippolytus* and the *Egyptian Church Order* are evidently related, but which is the basis of the other has been disputed. The growing opinion, however, is that the *Canons of Hippolytus* is the earlier collection. The importance of these works lies in their aid in reconstructing the life and order of the early Church. The *Canons* contain directions for the ordination of the orders of the clergy, for the admission of converts to the Church, for the Eucharist and its preceding fast, for the visitation of the sick, for worship in the church and in private, and for the life of the ordinary Christian and of the ascetic. They show the progress ritualism and asceticism had made in the Church, but also lay stress on moral life and personal religion. Consult: Achelis, in *Texte und Untersuchungen*, vol. vi (Leipzig, 1891); Funk, *Die apostolischen Constitutionen* (Rottenburg, 1891); Riedel, *Kirchenrechtsquelle des Patriarchats Alexandrien* (Leipzig, 1900); O'Leary, *The Apostolic Constitutions and Cognate Documents* (London, 1906).

HIPPOMANE, hip-pōm'ā-nē. See MANCHINEEL.

HIPPOM'EDON (Lat., from Gk. Ἴππομέδων). In Greek mythology, the son of Aristomachus of Argos, and one of the seven leaders in the expedition against Thebes, in which he was killed by Ismarus. Consult Æschylus, *Seven against Thebes*, 475 ff. See SEVEN AGAINST THEBES.

HIPPOM'ENES (Lat., from Gk. Ἴππομένης). The son of Magareus and descendant of Poseidon. He was the lover of the Boeotian damsel Atalanta. See ATALANTA, 1.

HIPPONAX (Lat., from Gk. Ἴππώναξ). A Greek poet of the sixth century B.C.; next to Archilochus and Simonides, the greatest iambic poet of Greece. Expelled from Ephesus about 542 B.C. by the tyrant Athenagoras, he took refuge in Clazomenæ. There his deformed figure and malicious disposition exposed him to the caricature of the Chian sculptors Bupalus (q.v.) and Athenis; but he avenged himself by issuing against them a series of such bitter satires that tradition says they hanged themselves. These are in thought and execution inferior to the similar works of his predecessor, Archilochus. His coarseness of thought and feeling, his rude vocabulary, his want of charm and taste, and his numerous allusions to matters of merely local interest make him a unique figure in Greek literature. He invented epic parody; the four opening lines of his parody on the *Iliad* have been preserved in *Athenæus* (p. 698 f.). He also invented the choliambic or Hipponactean measure, in which a trochee or spondee is substituted for the final iambus in an iambic trimeter. (See VERSIFICATION, *Greek and Latin: Iambic Rhythms*.) The substitution of the trochee or spondee for the final iambus gives to the verse, at least at times, a limping or halting effect, which adds much to the force of verse scornful in itself. The fragments of the poems of Hipponax are edited by Bergk, *Poete Lyrici Græci*, vol. ii (Leipzig, 1914). Consult Christ-Schmid, *Geschichte der griechischen Litteratur* (2 vols., 5th ed., Munich, 1908-13).

HIPPOPH'AGY (from Gk. ἵπποφάγος, *hippophagos*, horse eating, from ἵππος, *hippos*, horse + φαγεῖν, *phagein*, to eat). The eating of horseflesh. That semicivilized nations eat horseflesh is well known.

In 1855 and 1856 there was a good deal of discussion in Paris relative to the formal introduction of horseflesh into the meat markets, and some of the more enthusiastic advocates of the plan formed themselves into a society. French skill was exercised abundantly in disguising the somewhat coarse taste and odor of horseflesh.

In 1866 there was official recognition of the introduction of this kind of food into the market under such restrictions as were deemed suitable. The prefect of the Seine issued an ordinance in June of that year, recognizing horseflesh as human food, establishing special slaughterhouses or abattoirs for slaying horses under specific regulations. The animals were to be killed by those specially appointed in presence of a veterinary inspector, who was also to stamp or seal every joint of meat after inspection. All restaurateurs who used horseflesh were to acquaint their customers with the fact. During the French International Exhibition of 1867 some of the humbler restaurants of Paris made great use of horseflesh; and during the siege of Paris, in 1870-71, horseflesh was extensively used as

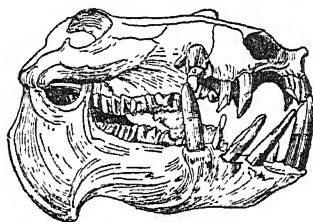
food. At the present time the eating of horseflesh is not at all uncommon in European countries. It is very largely employed in the manufacture of sausages, and in Paris there are a considerable number of places where the meat of horses, mules, and donkeys is for sale. The objection to the use of good horseflesh for food is wholly sentimental, and its cheap price is of great advantage.

HIPPOPOTAMUS (Lat., from Gk. ἵπποπόταμος, *hippopotamos*, river horse, from ἵππος, *hippos*, horse + ποταμός, *potamos*, river). A huge, thick-skinned, almost aquatic, kind of mammal of tropical Africa, two living genera and many fossil species of which constitute the family Hippopotamidae. This family is closely allied to the swine, and it would be more nearly accurate to call them river hogs rather than river horses. They differ from the swine and peccaries, however, in having a broad rounded muzzle, with the nostril superior and no trace of a terminal disk (see SWINE); in having all the toes touch the ground and nearly equal in size; in the continual growth of the lower incisor teeth; and in other anatomical details. The family seems always to have been confined to the Old World; but remains of various species have been found in the Upper Tertiary rocks of Burma and Algeria, and others, nearer the modern type, in the Pliocene and later formations of India and of southern Europe. Within the historic period, at least, the hippopotami have been restricted to Africa—unless one may believe, from biblical references to the behemoth (q.v.), that it has inhabited Palestine since the origin of tradition—where it seems to have occupied all the larger lakes and rivers until locally exterminated by man. Anciently it possessed the whole Nile and was killed by the early Egyptians by means of harpoons; but for centuries none have been seen below the cataracts. When white settlements began at the Cape of Good Hope, “hippos” lived in the most southern of African rivers, but gradually disappeared, until now the upper Limpopo marks the southern boundary of their habitat. They are likely to die out of the East African rivers speedily, but the endless marshes of the upper Nile and its tributaries and the vast swamps and waterways of the Congo basin will preserve the animal indefinitely. These remarks refer to the familiar species (*Hippopotamus amphibius*), in addition to which a species, placed in a genus of its own (*Choropsis*), small in size and more swinelike in appearance, is found in Liberia.

The Common Hippopotamus. This is, next to the elephant, the bulkiest of land mammals. Old males are from 12 to 14 or more feet long, stand nearly 4 feet high at the shoulder, and weigh about four tons. The body is elongated, barrel-shaped, and the belly nearly touches the ground, while the swollen, ugly head seems too heavy even for the massive neck, and the animals, when out of the water, usually rest the chin upon each other or some support. The body is carried upon short piglike legs, having four toes upon each foot, each covered with a round black hoof and resting flat upon the ground, but connected by webs. The skin is two inches thick in some places, is spongy, like that of a walrus, rough, warty and covered with a network of fine wrinkles, and it varies in color in the male from dark leather brown to bluish gray, more or less spotted. The females usually are of lighter tint, and both sexes are lighter on the belly. The skin

is naked except for the bristles on the muzzle, and a few tufts of short hair upon the sides of the head and neck and on the ears and tail. It contains a great quantity of an oily substance which exudes from the pores; and under excitement this flows out copiously and is tintured with blood, producing the “bloody sweat” for which this beast is famous. The tail is short and laterally compressed.

Habits and Food. The hippopotamus is most at home in the water, and aquatic vegetation is its natural fare. To this its organization has become particularly adapted. It swims well, makes long excursions, sometimes into open water, and even goes some distance out into the salt estuaries of rivers. It is able to dive quickly, but its ordinary method of submergence is quietly to sink to the bottom, where it is said that it may walk about, browsing, for several minutes. To this end not only its nostrils but its small ears are closed by sphincter muscles, keeping out the water; and its infolded lips prevent an inrush of water in feeding. The nostrils and eyes are so high that it need only expose an unnoticeable fraction of the face in order to breathe and look about, while its entire body is safely hidden beneath the surface. The peculiar dentition and digestive organs have reference to this manner of life and to a diet of coarse herbage. The enormous mouth, which may open to the extent of 4 feet, is furnished with numerous ivory-capped grinders, and with powerful rooting and biting teeth in front. The larger teeth are the tusks or canines, which are



SKULL AND TEETH OF HIPPOPOTAMUS.

curved backward and have their ends obliquely leveled off by mutual attrition. These tusks and the incisor teeth continue to grow during the life of the animal, and their points turn downward. In this respect these teeth differ from the pig's, which form roots.

The hippopotamus cuts grass or corn as if it were done with a scythe, or bites with its strong teeth a stem of considerable thickness neatly through; it also tears up the marsh growth by means of its great tusks. Its food consists chiefly of the plants which grow in shallow waters and about the margins of lakes and rivers; and probably it renders no unimportant service in preventing slow streams from being choked up by the luxuriance of tropical vegetation. It often, however, leaves the water, chiefly by night, to feed on the banks and makes inroads on cultivated fields, devouring and trampling the crops. As considerable quantities of such fare must be consumed in order to obtain sufficient nutrition, the hippopotamus possesses an enormous stomach, the axial length of which is 11 feet, while the greater curvature measures 15 feet. It fills nearly the entire length of the body and is divided into three distinct compartments, of which the third is cylindrical, with the pylorus almost in the pelvis. It is mainly

in this third compartment that assimilation occurs.

These beasts are gregarious; herds of 12 or 20 gather where food is plentiful, and they seem to remain in one locality all their lives unless much disturbed. During the day they lie hidden, usually asleep, on some marshy islet and betray their presence, if at all, by their snorting, coughing, or grunting, which in anger becomes a hoarse roar. It is at night that they are most active, feed most, and leave the water to graze on shore or invade neighboring fields of millet and the like. Their excursions sometimes extend 7 or 8 miles in a night, and regular paths are trodden through the waterside jungle, in which the negroes dig pits or arrange deadfalls for the capture of the animal. Usually only one offspring is born annually, after a gestation of seven and a half months. The mother takes it into the water immediately, but, as it is unable to swim, supports it upon her neck until it learns how to take care of itself; she also protects it most assiduously, not only from crocodiles and other enemies, but from the rage of the males, who will kill infants unless prevented. The young nurse under water and continue to grow for five years, after which they may live 25 or more years.

Though the brain of this animal is very small and its life a dull one, it is by no means stupid. It quickly learns, when much hunted, not to expose itself nor to indulge in a whalelike snort when it rises to breathe. Its scent apparently is very keen and its vigilance great. Captives learn the names and faces, voices and customs, of their keepers and exhibit much general intelligence. They are naturally very timid, yet curious, and subject to fits of panic or rage. Hence small boats are always endangered by going near them, and even large steamboats have been attacked. A wounded or enraged hippopotamus is regarded by sportsmen as perhaps the most dangerous beast to be encountered. Pure malice seems frequently to dictate their actions. The natives more often get them by strategy than by bold attack. The negroes eat the flesh and fat and make some use of the hide. By white men the animals are shot mainly for sport and near the coast for the sake of the hide, out of which coverings for handles (shrunken on), bull whips, and polishing wheels are made; also for the ivory of the great canine teeth, which sometimes exceed 30 inches in length; but this ivory is not so much valued now as it was early in the nineteenth century, when it was in demand for the making of artificial teeth.

The Pygmy or Liberian Hippopotamus. Concerning this small species not much is known. It appears to be restricted to the Guinea coast and to be much less aquatic than its large relative. It wanders and seeks its food in swampy woods, after the manner of a pig, but never gathers in herds. It is about 6 feet long, 2½ feet tall, and weighs from 400 to 600 pounds. In color it is bluish black along the back, paling gradually to greenish white on the ventral parts. The fact that it sometimes has only one pair of incisor teeth, instead of two, in the lower jaw, has led to its being placed in a separate genus (*Cheropsis*).

In 1912 three of these exceedingly rare animals were received alive at the New York Zoological Park, where in 1914 they were living in good health. For a full account of these, consult Hornaday and Schomburgk, *Zoological Society Bulletin*

(New York, 1912), also G. Rensham, *Natural History Essays* (London, 1904).

Fossils. Remains of the hippopotamus have been found in the Pliocene and Pleistocene deposits of India, Burma, Algeria, and Europe. Hippopotami roamed in herds over England not very long before the period of the earliest human occupation, and the remains of individuals of all sizes have been found in the gravels near Cambridge. Remains of dwarf species, associated with those of dwarf elephants, are found in the cave and fissure deposits of the islands of Sicily and Malta. No remains of fossil hippopotami have yet been found in America.

Bibliography. Consult general works, especially Wright, *Standard Natural History*, vol. v (Boston, 1885); Oakley and Boyd-Dawkins in *Cassell's Natural History*, vol. ii (New York, 1884); also writings of African explorers and sportsmen, especially Livingstone, Gordon-Cumming, and Speke; also Georg Schweinfurth, *Heart of Africa* (London, 1873); Emil Holub, *Seven Years in South Africa* (ib., 1881); S. W. Baker, *Wild Beasts and their Ways* (ib., 1890); Richard Lydekker, *Game Animals of Africa* (ib., 1908); Roosevelt and Heller, *Life-Histories of African Game Animals* (New York, 1914).

See Plate of TAPIRS and HIPPOPOTAMUS; and Colored Plate of PACHYDERMS.

HIPPO REGIUS. See HIPPO.

HIPPOTHŌŌN (Lat., from Gk. ἵπποθών). The hero of the Attic tribe Hippothōntis. He was the son of Poseidon and Alope, the daughter of Cercyon of Eleusis, and was exposed as a newborn infant, but was suckled by a mare and brought up by shepherds. When Theseus overcame and killed Cercyon, he transferred the government to Hippothōn.

HIPPU'RIC ACID (from Gk. ἵππος, *hippos*, horse + οὔρον, *ourom*, urine), $\text{CH}_2\text{NH}(\text{C}_6\text{H}_5\text{CO})\text{COOH}$. A compound of great interest, both to the chemist and to the physiologist. It derives its name from its having been first discovered in the urine of the horse, and that fluid, or the renal secretion of the cow, affords us the best and readiest means of obtaining it. The fresh urine is boiled with a slight excess of milk of lime and filtered; the filtrate is evaporated to a small volume, cooled, and acidified with hydrochloric acid, when hippuric acid separates out in the form of fine needle-like crystals. It may be purified by dissolving it in hot water, passing a stream of chlorine gas into the solution, and filtering hot. When obtained by a process of slow crystallization, the crystals of hippuric acid are moderately large, at first colorless, but subsequently becoming milk-white four-sided prisms, which are devoid of odor, but have a faintly bitter taste. They dissolve readily in boiling water and in spirit, but are only sparingly soluble in cold water and in ether. The melting point of the pure acid is 187.5° C. (369.5° F.). Its chemical name is benzoyl-aminoacetic acid, and it may be prepared artificially from benzoic acid, $\text{C}_6\text{H}_5\text{COOH}$, and glycine, $\text{CH}_2\text{NH}_2\text{COOH}$. When boiled with strong mineral acids, hippuric acid takes up water and splits up again into its chemical components, benzoic acid and glycine. It is a normal constituent of the urine of the horse, cow, sheep, goat, hare, elephant, etc., and most probably is to be found in the urine of all vegetable feeders. In normal human urine, if the food is an ordinary mixed diet it occurs in very small quantity, but is increased by an exclusively vegetable

diet and in the well-known disease diabetes. Although hippuric acid usually occurs in mere traces in human urine, we can artificially produce it at will in the body and cause it to be eliminated in comparatively large quantity. If we swallow benzoic acid, it seems to take up the elements of glycine in its passage through the system and thus to form hippuric acid, which appears abundantly in the urine. Hippuric acid is formed in the animal body not only from benzoic acid itself but from any substance that may be readily transformed into benzoic acid. Some such substances are contained in grass, hay, and in many berries, and are also found among the products of the putrefaction of proteids, especially those of vegetable origin. In carnivora the formation of hippuric acid has been shown to take place chiefly in the kidneys; in the herbivora, however, benzoic acid is largely transformed into hippuric acid even if the kidneys have been removed. In birds the ingestion of benzoic acid causes the formation, not of hippuric, but of *cananthylic* acid. The hippuric acid which occurs in the animal organism exists in combination with bases, chiefly as hippurate of sodium and hippurate of calcium. The last-named salt can be obtained by the mere evaporation of the urine of the horse. As shown by Dehn in 1908, the presence of hippuric acid in urine may be demonstrated by adding enough of a solution of sodium hypobromite to color the urine yellow; if hippuric acid is present, a characteristic brownish-red precipitate is formed.

HIPPURITIDÆ (Neo-Lat. nom. pl., from Gk. *ἵππουρις*, *hippouriis*, horse-tailed, from *ἵππος*, *hippos*, horse + *οὐρά*, *oura*, tail). A family of pelecypods, representing the most extreme development of the highly aberrant branch of the Rudistæ. In this family, which is typically represented by the genus *Hippurites*, the lower valve has become a cylindroconic body, attached by the apex, of columnar appearance, through deep sutures representing the anal, branchial, and ligamentary inflections. The other valve is developed into a flat cover, bearing three long toothlike processes, which fit so closely into corresponding sockets of the lower shell that they are difficult to prepare. The living chamber of the animal is extremely small, since the lower valve is filled with a porcelaneous white inner layer that forms septa and interseptal spaces, as in a cephalopod. The shells of *Hippurites* reach a meter or more in length, and like the other Rudistæ they occur in vast numbers in the Middle and Upper Cretaceous beds of the Mediterranean countries and of western Asia and became extinct at the end of Cretaceous time. An American form is *Hippurites barretii*, which is found in the Cretaceous of Jamaica and Guatemala. See RUDISTÆ; PELECYPODA.

HIPURINA, ē-pō'rē-nā'. A tribe of the middle Purus of western Brazil, one of the most warlike on the river, and estimated at perhaps 2500 souls. They live in long, low houses, built of converging poles, and use poisoned arrows with heads notched so as to break off in the wound. They wear only the breechcloth, but are clean and self-respecting.

HIRADO, hē-rā'dō (in old books *FIRANDO*). An island in the northwest of the entrance to the Bay of Omura, off the coast of Hizen, Japan, with a capital of the same name containing 10,600 inhabitants. It was made famous in the sixteenth century as the place of welcome to the Portuguese (the first foreigners to visit Japan),

and later, in 1600, to the Dutch, and in 1609 to the English. From 1609 to 1611 the English, and from 1609 to 1640 the Dutch, had a trading station here, the latter in 1640 being transferred to the little artificial island of Deshima (q.v.) at Nagasaki. Consult *The Diary of Richard Cocks* (Hakluyt Society, London, 1883).

HIRAM, or **HURAM** (perhaps an abbreviation of *Ahram*, brother of the High One, or, *Ahi* is exalted). 1. King of Tyre. He is represented as David's friend and ally and assisted him in the building of his palace by contributions of timber and labor (2 Sam. v. 11; 1 Chron. xiv. 1). Upon Solomon's accession Hiram sent cedar and other timber and skilled workmen for the building of the temple, in return for which Solomon paid a yearly tribute (1 Kings v. 1-12). The two kings remained constant friends, and Hiram supplied Solomon with a navy (1 Kings ix. 26-28, x. 22). Hiram waged a successful war against Cyprus and fortified the island of Tyre. The question has been raised whether the same King of Tyre could have been the contemporary of both David and Solomon, both of whom had long reigns. If we assume, however, that David undertook his building operations during the latter part of his reign, there is no reasonable ground for doubt; though it is, of course, possible that for David's reign we should substitute the name of Abibaal, the father of Hiram. 2. According to 1 Kings vii. 13 et seq., a Tyrian artificer who was sent by Hiram, the King of Tyre, to assist in the building of Solomon's temple.

HIRAM COLLEGE. A coeducational institution of higher education at Hiram, Ohio, founded in 1850 as the Western Reserve Eclectic Institute, of which James A. Garfield was a student, teacher, and principal. It became a college in 1867 and had, in 1914, 242 students, of whom 233 were enrolled in the college proper, the preparatory school having been discontinued in 1911. The library contains about 13,000 volumes. The equipment includes women's dormitories, observatory and telescope, museum, gymnasium, athletic field, and laboratories. Besides dwellings, the college owns six buildings wholly devoted to college purposes. The endowment fund is about \$300,000. The president in 1914 was Miner Lee Bates, A.M., Ph.D.

HIRE, E. and L. DE LA. See **LA HIRE**.

HIRE-PURCHASE AGREEMENT. A contract which combines the elements of hiring and of sale of a chattel. Its usual form is the hiring of a chattel to a would-be purchaser, the purchase price to be paid in fixed installments, the chattel continuing to be the property of the vendor until the last installment is paid. The real object of the transaction being the sale of the property, it is more frankly described by the title which it usually bears in the United States, of an installment sale; but the hiring provision, which preserves the title in the vendor, while at the same time giving the purchaser the possession and use of the property, is legally binding and is sustained by the courts. This feature of the agreement takes it out of the category of contracts of sale and exempts it from the operation of the Bills of Sale acts in England and the United States which require registration of such contracts. The form of a hire-purchase agreement is sometimes employed as a cover for a contract of sale or a loan on the security of chattels, and the court will look into the real nature of the transaction to de-

termine whether it is what it purports to be, viz., a real contract of hiring with an option of purchase, or a sale, mortgage, or pledge. Under the terms of the agreement the lender or vendor is generally permitted to retake the chattel on default of payment of an installment when it falls due, the payments previously made being retained by the lessor as compensation for the hire of the property. The hardships which often result from such default have led to attempts to avoid the forfeiture or to secure for the defaulting hirer a further period of redemption, but these efforts have met with no success. Where the agreement is found to be in reality a hire and purchase agreement and not a mortgage or pledge, it is invariably enforced in accordance with its terms. More difficult questions present themselves where the hire-purchase agreement contemplates the annexation of the chattels to the freehold of the hirer or purchaser, as where machinery is sold to a manufacturer, or plumbing to a builder for installation in a building under an agreement that the articles are to remain the property of the vendor until paid for. Such a transaction is more in the nature of a sale and purchase-money mortgage than of a hiring agreement, but it is nevertheless sustained by the courts in accordance with its terms. See BAILMENT; HIRING; SALE.

HIRING. A transaction whereby the owner of a chattel transfers its possession to another under an agreement by the latter, known as the hirer, to pay a specified sum for the use of the same, the goods to be returned to the owner or lender at a specified time or on demand. Hiring a chattel is a recognized form of bailment, vesting in the bailee, the hirer, the complete right of possession during the period of the bailment and imposing on him certain definite obligations as to the use of the property bailed and the degree of care to be exercised by him while it is under his control. His possession is exclusive during such period and may not be interfered with, either by the bailor or by any one else, without subjecting the wrongdoer, even if the owner, to an action of trespass or of trover at the instance of the bailee. In the meantime the owner, having parted with the possession and the right to the possession of the chattel, is deprived of the right to maintain any possessory action (replevin, trespass, or trover) against a third person who may interfere with, injure, or destroy the property, though he may, if the act of such wrongdoer results in permanent injury to the chattel, sue him in an action on the case for the injury to his so-called reversionary interest. As against the bailee, the owner can never maintain trespass, though for a wanton destruction, sale, or other act of conversion committed by the latter, which has the effect of terminating the bailment and thus of reviving the owner's right of possession, he may have an action of trover. Indeed, any unwarranted use or abuse of the property by the bailee gives the owner the immediate right to demand its return and, if the demand be refused, to vindicate his right by an action of trover.

The bailee is bound to exercise ordinary care, such as a prudent man exercises in the case of his own property, and at the end of the bailment to restore the property to the owner without unnecessary delay. He is not liable for ordinary wear and tear, nor for injury or destruction caused by inevitable accident or resulting from the wrongful acts of others which could not in

the exercise of ordinary care have been prevented by him. If the article when returned is not in good condition, the law places in the bailee the duty of showing that its impairment of value was not due to his fault under the rule of liability above laid down. See BAILMENT; TRESPASS; TROVER.

HIRLAS (hêr'làs) **HORN**, THE. A long, blue, silver-rimmed drinking horn, mentioned in a Welsh poem of the same name, written by Owain, Prince of Powys, in the twelfth century.

HIRN, ern, **GUSTAVE ADOLPHE** (1815-90). A French physicist, born at Logelbach, near Colmar. When he was 19, he entered his grandfather's cotton factory as dye chemist; afterward he acted as engineer (1842) and began his valuable researches on mechanics and especially on heat. He was made a member of the French Academy of Science in 1867, in 1880 founded a meteorological observatory near Colmar, and later devoted himself to astronomy. Hirn was educated in the shop, and his works are marked by much practical criticism of mere academic theory. They include: *Théorie mécanique de la chaleur* (3d ed., 1875-76); *Analyse de l'univers* (1869); *Mémoire sur les anneaux de Saturne* (1872); *Les pandynamomètres* (1876); *Etude sur une classe particulière de tourbillons* (1878); *Recherches expérimentales sur les relations entre la résistance de l'air et sa température* (1882); *La vie future et la science moderne* (1882); *Constitution de l'espace céleste* (1889).

HIRN, Yrjö (1870-). A Finnish educator and writer on aesthetics. He was born in Villmanstrand and was educated at the University of Helsingfors, where he became professor of aesthetics and of modern literature in 1898. His works, of great importance for aesthetic theory and for their presentation of primitive art, include: *Forstudier till en Konstfilosofi* (1896); *Pueblo Folkens Konstliv* (1901); *The Origins of Art* (1900; in Swedish, 1902; in German, 1904); *Det heliga Skrinet* (1908; in English, *The Sacred Shrine*, 1912), a study of the art and poetry of the Catholic church; *Det estetiska Livet* (1913).

HIROSAKI, hêrô-sâ'kê. A town of Japan, situated in the northern part of Honshu, 22 miles by rail from Asmori (Map: Japan, G 3). It contains ruins of an old castle and a museum. The chief product is lacquered ware. Pop., 1898, 34,771; 1908, 37,487.

HIROSHIGE, hêrô-shê'gê, **ANDO** (1797-1858). A Japanese landscape painter for color printing from wood blocks, of the *Ukiyô* (Popular) school. He was born of a Samurai family in Yeddo (Tokyo), and when only 10 years old painted the procession of the embassy from the Riu-Kiu (Loo-choo) islands in such a lifelike manner and with such good colors as to attract attention. At 15 he sought instruction from Toyokuni, who had so many pupils that he refused him. But Toyohiro received him, and in recognition of this the pupil assumed the name of Hiroshige in place of his original name of Tokutaro. On his teacher's death, in 1828, he opened his own studio, but, on account of the popularity of Toyokuni's prints of actors and figure groups, had a hard struggle. His first great success was with pictures of the Tokaido, the wonderful highway between Yeddo and Kyoto. These and other landscapes by him were so much admired that soon many other artists forsook the figure school and imitated him. What brings Hiroshige close to us of the Occi-

dent is that his method of representation shows European influence, though his work remains always completely Japanese. He observes the rules of perspective to a certain extent, aspires to correct composition, with proper adjustment of foreground and background; and his designs have both inner unity and outer finality, as contrasted with those of the Chinese, which seem to float in the air. While his technique is of architectural precision, he always sees nature with his own eyes and renders with his brush the mood of a landscape seen in a certain light and from a certain point of view. In the Metropolitan Museum, New York, are important prints by Hiroshige from the Francis Lathrop and other collections. One of his pupils took the name of Hiroshige II, another, that of Hiroshige III. Consult: E. F. Fenollosa, *The Masters of Ukiyo* (New York, 1896); Wolde-mar von Seidlitz, *History of Japanese Colour-Prints* (ib., 1910); Amsden-Happer, *The Heritage of Hiroshige* (San Francisco, 1912).

HIROSHIMA, hē'rō'shē-mā. The capital of the Japanese Province of Aki and of the Prefecture of Hiroshima, situated at the southwest end of Hondo, about 3 miles inland (Map: Japan, C 6). It lies in a beautiful region at the foot of a hill and contains a number of fine temples, a park, and tea houses. Opposite the city is situated the sacred island of Miyajima, or Itsukushima, with its celebrated Shinto temple. Commercially Hiroshima is considered the most important place west of Kobe and forms the centre of the trade in lacquered ware, bronze, and other objects of art. Pop., 1898, 122,306; 1908, 142,763.

HIRPINI, hēr-pī'nī (from Sabine *hirpus*, wolf). A people of ancient Italy, who inhabited the southern portion of Samnium. They have been considered by some authorities as merely a Samnite tribe. (See ITALIC LANGUAGES, *The Italic Dialects in Detail*; SAMNITES.) By others they are looked upon as an independent nation. The country they inhabited was the wild and mountainous district traversed by the Sabatus, the Calor, and the Tamarus, tributaries of the Vulturinus, and, on the east side of the Apennine ridge, by the upper course of the Aufidus. In the early history of Rome the Hirpini are found identifying themselves with their Samnite neighbors against the Romans. They seem to have been subdued in the early part of the third century B.C., as in 268 B.C. Beneventum (see BENEVENTO), the key of all their military positions, was colonized by Romans. In the Second Punic War, revolting from their conquerors, they joined the Carthaginian invaders, and, though they were unable to recapture their stronghold of Beneventum, they remained faithful to Hannibal till the defeat of Hasdrubal at the Metaurus restored the Empire of Italy to the Romans. In this year (207 B.C.) the Hirpini made peace with the Romans by betraying into their hands the garrisons of the Carthaginians. From this time till the outbreak of the Social War (q.v.), the Hirpini seem to have continued steadfast in their allegiance to Rome. On that occasion, however, they set the example of revolt and might have become formidable enemies had not the rapid successes of Sulla induced them to repair their error by a complete submission. At the close of this war the Hirpini obtained the franchise and do not again appear in history as an independent people. Consult R. S. Conway, *Italic Dialects* (Cambridge, 1897).

HIRSCH, hērsh, AUGUST (1817-94). A German physician, born at Danzig, where he practiced after studying at Berlin and Leipzig. In recognition of his studies on malarial fever and his work, *Handbuch der historisch-geographischen Pathologie* (2d ed., 1881-86), he was in 1863 made professor of the history of medicine at Berlin. In 1873 he was a member of the German Cholera Commission, studied the conditions of Posen and West Prussia, and published a valuable report (1874). He studied the plague in Astrakhan in 1879 and 1880 and in the latter year wrote a report to his government. His more important writings are: *Die Meningitis Cerebro-spinalis Epidemica* (1866); *Geschichte der Augenheilkunde* (1877); *Geschichte der medizinischen Wissenschaften in Deutschland* (1893); a revision of Hecker's collected writings, under the title *Die grossen Volkskrankheiten des Mittelalters* (1865). He edited *Biographisches Lexikon der hervorragenden Aerzte aller Zeiten und Völker* (1884-88) and, with Virchow, *die Jahresbericht über die Fortschritte und Leistungen der Medizin* (1866 et seq.).

HIRSCH, CARL (1858-). A German composer, born at Wemding, Bavaria. He began life as a school-teacher, but soon abandoned that career for music. He was church music director at Munich (1885-87); music director at Mannheim (1887-92), at Cologne (1892-93), at Elberfeld (1893-); and director of the Gesangschule, the Liedertafel, the Philharmonic concerts at Elberfeld. But it is as a composer that Hirsch is best known, his *a-cappella* male choruses, which are very numerous, and his cantatas being widely known and used. Of the latter *Die Krone im Rhein* and *Landknechtsleben* are representative. His songs and ballads are scarcely inferior to his male choruses.

HIRSCH, EMIL GUSTAV (1852-). An American rabbi, born in Luxemburg, the son of a prominent Jewish theologian who in 1866 became minister of the Reformed Congregation in Philadelphia. He graduated at the University of Pennsylvania in 1872 and studied at Berlin in 1872-76. He was rabbi in Baltimore (1877) and in Louisville, Ky. (1878-80), but did his greatest work in Chicago, whither he went in 1880 as minister of the Sinai Congregation. He took some part in politics as a member of the Republican party, was president of the Chicago Public Library Board (1888-97), in 1892 became professor of rabbinical literature and philosophy in the University of Chicago, and in 1902 was Trumbull lecturer at Johns Hopkins. From 1880 to 1887 he edited the Milwaukee *Zeitgeist* and in 1894 undertook the editorial charge of the *Reform Advocate*. As a lecturer and writer, he is closely connected with advanced Judaism and with philanthropy. He translated and edited Dr. Einhorn's *Ritual for Jewish Reform Congregations*.

HIRSCH, JENNY (1829-1902). A German reformer and author, born at Zerbst, where she was a tutor for several years. She went to Berlin in 1860, wrote for the *Bazar*, under the pseudonym J. N. Heynrichs, until 1864, and about that time became interested in woman's rights and female education. A member of the Women's Congress of 1865 at Leipzig and for many years a leader in the Lette-Verein, she edited *Der Frauenmooalt* (1870-82) and, with Lina Morgenstern, *Deutsche Hausfrauenzeitung* (1887-92); with Mary Wall she wrote *Haus*

und Gesellschaft in England (1878); in 1881 published *Fürstin Frau Mutter*, and after it many other tales, artistically unimportant. Among them are the following titles. *Die Erben* (1889); *Der Amerikaner* (1894); *Vermisst* (1894); *Löwenfelde* (1896); *Der Amtmann von Rapshagen* (1890); *Schuldig* (1899); *Camilla Feinberg* (1901). Under the title *Hörigkeit der Frau* (3d ed., 1891), she translated into German Mill's *Subjection of Woman* and wrote a *Geschichte der 25 jährigen Wirksamkeit des Lette-Vereins* (1892).

HIRSCH, JOSEPH (1836-1901). A French engineer, of Jewish family, born at Lyons. Educated there, at the Ecole Polytechnique and the Ecole des Ponts et Chaussées, he worked on the canal at Sarrebourg (1866) and there invented the Mittersheim siphon for the automatic control of reservoirs. From 1876 to 1898 he was professor of steam machinery at the Ecole des Ponts et Chaussées, and from 1886 until his death at the Conservatoire des Arts et Métiers. He contributed to the *Annales* of the former school; as member of the juries of award at the expositions of 1878 and 1889 and as president of the jury of 1900, he wrote valuable reports and lectured on the machinery exhibited at these expositions; and was the author of many treatises on machinery, including *Théorie des machines aéro-thermiques* (1874-75). His contributions to Lechals's *Encyclopédie* should also be mentioned, as well as his *Traductions de notes sur l'Amérique* (1875).

HIRSCH, MAURICE, BARON DE (MAURICE DE HIRSCH DE GEBEUTH) (1831-96). An Austrian Jewish financier and philanthropist. He inherited his father's wealth in 1869 and greatly increased his fortunes by his marriage to the daughter of the senior partner of the banking firm of Bischoffsheim and Goldsmid, Brussels, with whom he had become associated. He also made large sums by building railways in Rumania and Turkey, from which countries he obtained vast concessions, whose money value he doubled by fortunate speculations. His fortune was estimated at \$200,000,000, and his income at from \$15,000,000 to \$20,000,000 a year. He gave to charity about \$100,000,000 during his life, and the Baroness de Hirsch on her death, in 1899, bequeathed about \$15,000,000 to charities. These benefactions were chiefly for the alleviation of the condition of the Jews. He gave not less than \$50,000,000 to the Jewish Colonization Association, by which colonies were established in the Argentine Republic. He endowed the Galician schools with \$5,000,000 and in 1888 offered \$10,000,000 to the Russian government for schools, provided no distinctions of race or religion should be made in its distribution. His offer was declined. He gave \$2,500,000 to establish a fund in New York for educating and Americanizing Russian and Rumanian Jews. The sum of \$1,200,000 was added to this fund by the Baroness, who died in Paris, April 1, 1899.

HIRSCH, MAX (1832-1905). A German political economist and politician, born at Halberstadt in Prussian Saxony. He studied political economy and jurisprudence at the universities of Tübingen, Heidelberg, and Berlin, and then traveled through France and north Africa. As the result of his observations during these travels, he published *Skizze der volkswirtschaftlichen Zustände in Algerien* (1857) and *Reise in das Innere von Algerien, durch die Ka-*

bylie und Sahara (1862). In 1859 he established a publishing house in Berlin, but soon gave it up for political and club life. After a journey through England and Scotland (1867-68), he returned home to organize trades-unions among his countrymen. These soon spread all over Germany, and through them and their organ, *Der Gewerksverein*, he wielded great influence. He was several times a member of the Reichstag and was the leading spirit in a number of societies for the benefit of the laboring classes. His publications include *Was bezwecken die Gewerksvereine?* (15th ed., 1891) and *Das Invaliditäts- und Altersversicherungsgesetz* (3d ed., 1890).

HIRSCHBERG, hêrsh'bêrk. A manufacturing town in the Prussian Province of Silesia, situated at the foot of a mountain, 30 miles southwest of Liegnitz (Map: Germany, F 3). The town is ancient and still girt about by a double line of walls. Its large Protestant church, a Gothic edifice, is known for its excellent organ. Hirschberg has manufactures of linen, lace, yarn, cotton goods, Venetian blinds, strawboard, cement, porcelain, machinery, paper, metal, and tobacco. Much wine is made, and there is trade in grain, wine, cement, linen, and butter. The town was founded at the beginning of the eleventh century. Pop., 1900, 17,865; 1910, 20,564, mostly Protestants.

HIRSCHBERG, JULIUS (1843-). A German ophthalmologist. He was born in Potsdam and was educated at the University of Berlin, where he graduated as M.D. in 1866, became assistant to Von Graefe, lecturer (1869), and professor (1879). His works cover nearly every branch of ophthalmology, but are particularly valuable for the history of this branch of medicine. They include: *Markschwamm der Netzhaut* (1869); *Beiträge zur praktischen Augenheilkunde* (1876-78); *Der Elektromagnetismus in der Augenheilkunde* (2d ed., 1899); *Wörterbuch der Augenheilkunde* (1887); *Einführung in der Augenheilkunde* (1892-1901), a history of ophthalmology—in antiquity (1899), among the Arabs (1905), in the Middle Ages (1906), from the Renaissance to the eighteenth century (1908), in the eighteenth century (1909-11), in Germany in 1800-50 (1912), in France (1912); *Behandlung der Kurzsichtigkeit* (1910, and in English). He also wrote sketches of travel—*Tunis* (1885), *Von New-York nach San Francisco* (1888), *Aegypten* (1890), *Um die Erde* (1894), *Hellas-Fahrten* (1910).

HIRSCHFELD, GEORG (1873-). A German novelist and dramatist. He was born in Berlin, left a Berlin Gymnasium at the age of 17 to go into business, but in 1893, under the patronage of Hauptmann and Wildenbruch, began his literary career and studied at the universities of Munich and Berlin. In Berlin he was as Hauptmann's pupil a member of the group that figured in the Freie Bühne movement, and his first novel, *Damon Kleist* (1895), and his one-act play, *Zu Hause* (1896), were first printed in the *Freie Bühne*, an organ of the movement, and his most successful play, *Die Mütter* (1896), had a long run in 1895 at the Free Theatre of Berlin. At the Vienna Burg-Theater in 1898 appeared his *Agnes Jordan*, a play in five acts, which, with a fine disregard for unities, presents in each act a different period in a woman's life, and which more than most of his other work shows the influence of Ibsen. At Munich, where Hirschfeld definitely

settled in 1912, he was a member of the circle of Halbe and the Intimes-Theater. His works, besides those already mentioned, include the novels and romances *Die Bergsee* (1896), *Freundschaft* (1902), *Das grüne Band* (1905), *Das Mädchen von Lille* (1906), *Der Wirt von Velduz* (1907), *Hans aus einer anderen Welt* (1909), *Die Niwe vom Güldensee* (1910), *Angst und Emma* (1911), *Der Kampf der weissen und der roten Rose* (1912), *Onkel und Tante Vante* (1913), and *Pension Zweifel* (1913); and the plays *Pauline*, a "Berlin comedy" (1899), *Der junge Goldner* (1901), *Der Weg zum Licht* (1902), *Nebeneinander* (1904), and *Ueberwinder* (1913).

HIRSCHFELD, hêrsh'fêlt, GUSTAV (1847-95). A German archaeologist, born at Pyritz in Pomerania. He was educated at Tübingen, Leipzig, and Berlin, and was sent by the Prussian Archaeological Institute in 1870 to Greece, Italy, and Asia Minor. From 1875 to 1877 he had charge of the excavations at Olympia (q.v.) and in 1882 traveled again in Asia Minor. He was appointed professor of archaeology at Königsberg in 1878. Besides many articles in the archaeological journals, he wrote: *Tituli Statuariorum Sculptorumque Graecorum* (1871); *Athena und Marsyas* (1872); *Paphlagonische Felsen-gräber* (1885); *Berichte über alte Geographie* (1885); *Die Felsenreliefs in Kleinasien und das Volk der Hittiter* (1887); *Griechische Inschriften des Britischen Museums* (1893). He contributed also to the first two volumes of *Ausgrabungen zu Olympia* (1877-78). His *Aus dem Orient* was posthumously published (1897).

HIRSCHFELD, Otto (1843-). An eminent German classical scholar and historian, born at Königsberg. After having taught at Göttingen, Prague, and Vienna, he was in 1885 appointed to the chair of ancient history in the University of Berlin. Of his historical writings the most important is his *Untersuchungen auf dem Gebiete der römischen Verwaltungsgeschichte* (1876; 2d ed., 1905). He rendered especial service to classical learning as editor of Latin inscriptions: *Inscriptiones Galliae Narbonensis Latinae* (1888); supplement to the *Corpus Inscriptionum Latinarum*, vol. iii (1893); *Inscriptiones Aquitaniae et Lugdunensis* (1899); *Inscriptiones Belgicae* (1904). In 1913 he collected his minor papers under the title *Kleine Schriften*. Consult the *Berliner philologische Wochenschrift*, vol. xxxiv, pp. 812-816 (1914).

HIRST, FRANCIS W (RIGLEY) (1873-). An English economist. He was educated at Clifton College and at Wadham College, Oxford, studied law, and in 1907 became editor of the *Economist*. He was prominent, especially in 1913, in the English movement for an international agreement for disarmament. He wrote: *Essays in Liberalism* (1897), with others; *Liberalism and the Empire* (1900), with others; the very valuable *Local Government in England* (1903), with Redlich; *Adam Smith* (1904); *Monopolies, Trusts, and Kartells* (1905); *The Arbitrator in Council* (1906); *The Stock Exchange* (1911); *The Siam Panics and Other Essays* (1913).

HIRT, hêrt, HERMANN (1865-). A German philologist. He was born at Magdeburg, wrote on German metres (*Untersuchungen zur westgermanischen Verskunst*, 1889), edited Schopenhauer's *Parerga* (1890), and then, devoting himself to Indo-Germanic philology, made special studies on accent, writing *Der indogerman-*

ische Akzent (1895) and *Der indogermanische Ablaut, vornehmlich in seinem Verhältnis zur Betonung* (1900). Hirt, who became professor at Leipzig, made valuable contributions to Brugmann and Streitberg's *Indogermanische Forschungen*, on the morphology of case endings. In 1902 he published *Handbuch der griechischen Laut- und Formenlehre* (2d rev. ed., 1912), and in 1905-06 *Die Indogermanen*, on the primitive culture of the Indo-Germanic peoples. He also edited Weigand's *Deutsches Wörterbuch* (5th ed., 1909-10).

HIRTH, hêrt, FRIEDRICH (1845-). A German-American sinologue, born at Gräfen-tonna, Saxe-Gotha. He was educated at the universities of Leipzig, Berlin, and Greifswald (Ph.D., 1869) and from 1870 to 1897 was in the Chinese maritime customs service. He was consulted by Count von Bülow in 1900 on the question of the Boxer indemnity. In 1902 he was appointed to the professorship of Chinese in Columbia University (New York City). A collection of Chinese manuscripts and printed books made by him is in the Royal Library at Berlin, and another of porcelains of considerable historical importance in the Gotha Museum. As an investigator, he conducted researches in Chinese literature by imitation of the methods of classical philology. His chief publications include: *China and the Roman Orient: Researches into their Ancient and Medieval Relations as Represented in Old Chinese Records* (1885); *Ancient Porcelain: A Study in Chinese Medieval Industry and Trade* (1888); *Text-Book of Documentary Chinese* (2 vols., 1885-88); *Chinesische Studien*, vol. i (1890); *Ueber fremde Einflüsse in der chinesischen Kunst* (1896); *Scraps from a Collector's Note-book, Being Notes on Some Chinese Painters of the Present Dynasty, with Appendices on Some Old Masters and Art Historians* (1905); *The Ancient History of China* (1908); *Chau Ju-kua* (1911), with W. W. Rockhill; and many papers on subjects connected with Chinese literature. He contributed to the second edition of the NEW INTERNATIONAL ENCYCLOPÆDIA.

HIRTIUS, hêr'shî-ûs, AULUS (90-43 B.C.). A personal friend of Julius Cæsar, under whom he served in Gaul, and who in 46 B.C. nominated him as one of the 10 prætors. After the death of Cæsar he became consul, declared against Antony, and headed a reinforcement for Octavius. While leading an assault on Mutina (Modena), he was killed. It is said that he was the author of the eighth book of Cæsar's *Commentaries on the Gallic War*. See CÆSAR, GAIUS JULIUS; COMMENTARIES, CÆSAR'S; COMMENTARII. Consult Martin von Schanz, *Geschichte der römischen Litteratur*, § 122 (3d ed., Munich, 1909).

HIRUDO, hî-rûd'ô, HIRUDINEA. See LEECH.

HIRUNDINIDÆ (Neo-Lat. nom. pl., from *hirundo*, swallow). The swallow family. See SWALLOW.

HIRZEL, hêr'tsel, RUDOLF (1846-). A German classical scholar, son of Salomon Hirzel. He was educated at the universities of Heidelberg, Göttingen, and Berlin, and became professor of classical philology at Jena. He wrote: *Untersuchungen zu Ciceros philosophischen Schriften* (1871-83); *Der Dialog* (1895); *Der Eid* (1902); *Themis, Dike, und Verwandtes* (1907); *Plutarch* (1912).

HIRZEL, hêr'tsel, SALOMON (1804-77). A German publisher and an authority on Goethe.

He was born in Zurich, was a member of the firm of Weidmann in Leipzig until 1853, and then with his brother-in-law, Karl Reimer, founded an independent publishing house, which brought out Freytag's works, Grimm's *Wörterbuch*, and the publications of the Saxon Royal Academy, the Jablonowski Association, and the Prussian archives. Hirzel made a valuable collection of Zwingliana, which he left to the University of Strassburg. His valuable library on Goethe was willed to Leipzig University. Hirzel wrote *Der junge Goethe, 1764-76* (with an introduction by Bernays, 1875) and *Verzeichnis einer Goethe-Bibliothek* (1874). Consult article by Alfred Dove in the *Allgemeine deutsche Biographie*, vol. xii (Leipzig, 1880).

HIS, hēs, WILHELM (1831-1904). A German anatomist and physician. He was born in Basel, studied medicine there, in Berlin, Würzburg, and Vienna. He was professor at Basel (1857-72) and at Leipzig. His earlier researches were histological; afterward he devoted himself to anatomy and in a less degree to embryology. He edited with Braune the *Zeitschrift für Anatomie und Entwicklungsgeschichte* (1875-92) and in 1877 took charge of the anatomical department of the *Archiv für Anatomie und Physiologie*. Among his more important publications are: *Crania Helvetica* (1864), with Rüttimeyer; *Unsere Körperform* (1875); *Anatomie menschlicher Embryonen* (1880-85); *Die anatomische Nomenklatur* (1895); *Die Entwicklung des menschlichen Gehirns während der ersten Monate* (1904); and a reconstruction of the physiognomy of Bach after the discovery of his remains (1895), with Seifner.

HIS/COCK, FRANK (1834-1914). An American lawyer and legislator, born at Pompey, N. Y. He was admitted to the bar in 1855, served as district attorney of Onondaga County in 1860-63, and was a member of the State Constitutional Convention in 1867. Elected to Congress as a Republican Representative in 1877, he won repute as a debater and leader. From 1887 to 1893 he was a member of the United States Senate, being chairman of the Appropriations Committee. After his retirement he became connected with a large law firm and director of several banks.

HISGEN, hīz'gen, THOMAS LOUIS (1858-). An American manufacturer and political reformer. He was born at Petersburg, Ind., and was educated in the public schools. With his father and brothers he erected at Albany, N. Y. (1898), one of the largest axle-grease factories in the world. A bitter competitive struggle followed the refusal to sell their plant to the Standard Oil Company and resulted in the formation of Hisgen Bros., and the Four Brothers Independent Oil Company, with T. L. Hisgen as president. He was Democratic and Independence League candidate for State Auditor of Massachusetts in 1906, Independence League candidate for Governor of Massachusetts in 1907, and candidate of the National Independence party for President of the United States in 1908. He became president of the Independent Petroleum Marketers Association of the United States.

HISHAM, hēsh-ām'. The name of several Omniad rulers of Spain.—HISHAM I was Emir of Cordova from 788 to 796. He was a vigorous ruler and put down revolts with a firm hand. He also was successful in some expeditions against the Franks. He is, however, remembered chiefly for his personal habits. In

disguise he wandered incognito about the capital, succoring the poor and oppressed, caring for the sick, and inquiring into the administration of justice. His charity and justice endeared him to his subjects.—HISHAM II, Omniad Caliph of Cordova from 976 to about 1009, succeeded to the throne before he was 12. He had little ability and lived in seclusion, while his chief officer, Almanzor, made conquests from the Christians. Hisham was deposed and probably murdered.—With HISHAM III, who was deposed in 1031, the Omniad caliphate in Spain came to an end. Consult Stanley Lane-Poole, *The Moors in Spain* (New York, 1886; 7th ed., London, 1904).

HISPALENSIS, JOHANNES. See JOHN OF SEVILLE.

HISPA'NIA. The name by which the Spanish Peninsula, including the modern Spain and Portugal, was known to the Romans. The Greeks called it Iberia. The Roman poets sometimes called it Hesperia (the western land). The earliest inhabitants of whom we have any knowledge were the Iberians (q.v.), a race apparently unconnected ethnically or linguistically with any other race of Europe, of which the modern representatives are the Basques of northern Spain. But in very early times hordes of Celts crossed the Pyrenees and occupied almost the whole peninsula, pushing back or assimilating the Iberians, whence the natives were generally called Celtiberians by the ancients. (See CELTIBERI; GAUL; SPAIN, *History*.) The natural wealth of the country, especially its silver deposits, early attracted traders and colonists. About the middle of the fourth century B.C. the Greek colony of Emporiæ (Ampurias) was founded on the northeast coast. Phœnician traders early made the circuit of the coasts, and Gades (Cádiz) was one of their permanent trading stations. The Carthaginians, driven from Sicily, Corsica, and Sardinia by the Romans, determined to conquer Spain both as a source of wealth and as a base of operations against Italy. (See HAMILCAR, 7; HASDRUBAL, 2, 3; HANNIBAL.) Carthago Nova (see CARTAGENA) was their principal town, and they soon brought almost the entire country under their sway. From this city Hannibal set out to cross the Alps (218 B.C.); but his downfall at the end of the Second Punic War caused the loss of the country to the Carthaginians. The Romans now sought to subdue the country, but the task proved very difficult. (See SPAIN, *History*.) For a century or two the native tribes continued semi-independent, until the time of Augustus, who founded many colonies in Spain, through which the country was Romanized so completely that Spain contributed to the history of Latin literature such distinguished names as those of Seneca the rhetorician, Seneca the philosopher and writer of tragedies, Lucan, Quintilian, and Martial (the century in which these authors worked has been called the Spanish Period of Latin Literature). The peninsula was divided into three provinces: *Hispania Tarraconensis*, with its capital Tarraco (Tarragona) in the north and east; *Betica* in the south; and *Lusitania*, corresponding nearly to the modern Portugal. Consult M. F. Hübner, *La Arqueología de España* (Barcelona, 1888), and E. S. Bouchier, *Spain under the Roman Empire* (Oxford, 1914).

HISPANIOLA, his'pān-yō'lā. The Latinized name for Española, the island of Haiti (q.v.).

HISS, PHILIP HANSON (1868-1913). An

American bacteriologist. Born at Baltimore, Md., he graduated from Johns Hopkins University in 1891, and four years later from the College of Physicians and Surgeons (Columbia), where he was assistant bacteriologist (1895-99), instructor in hygiene and bacteriology (1899-1903), adjunct professor of bacteriology (1903-06), and professor thereafter until his death. He served also as assistant bacteriologist in the department of health of New York City in 1896-99. The results of his researches were presented to the Congress of Hygiene at Washington in 1912. He is coauthor with Hans Zinssner of *A Text-Book of Bacteriology* (1910).

HISSAR, his-sär'. The capital of a district of the Delhi division, Punjab, British India, on the West Jumna Canal, 102 miles northwest of Delhi by rail (Map: India, C 3). It is the seat of a governmental cattle farm with 43,287 acres devoted to pasturage; trade is carried on in cotton and cayenne pepper, and there is a cotton gin and compress here. Hissar was founded in 1356 and has interesting archaeological and historical remains. Pop., 1901, 17,647; 1911, 17,162.

HISSARLIK. See **TRÖY**.

HISTIAEA, his'ti-ä'a (Lat., from Gk. *Ἱστιαία*, *Histiāia*, dialect form of *Ἑστία*, *Hestia*, Lat. *Vesta*), or **OBEUS**. An ancient and important city of Euboea, on the north extremity of the island, in the District of Hellöpia. It was probably founded by settlers from the Histiaotis, on the mainland, driven out by the advance of the Thessalians. In the period following the invasion of Xerxes it passed into the hands of the Athenian League, but in 446 B.C. joined the rest of Euboea in a revolt. When the island was reduced by Pericles, the old inhabitants of the town were expelled, and Athenian colonists were settled in the neighboring village of Oreus, which soon developed into a flourishing city and gave the popular name to the colony, though officially it was still called Histiaea. At the end of the Peloponnesian War the descendants of the old inhabitants and other Euboeans replaced the expelled Athenians, and the city remained loyal to Sparta till after the battle of Leuctra, when it joined the second Athenian League. In the war between Philip of Macedon and the Athenians, Oreus was one of the centres of Macedonian intrigue, and in the confusion after Alexander's death, and later during the Roman wars, it was of considerable strategic importance. In 200 B.C. it was stormed by the Romans. After this it fell into decay.

HIS'TIAE'US (Lat., from Gk. *Ἱστιαῖος*, *Histiaios*) (?-494 B.C.). A tyrant of Miletus (q.v.), who guarded the bridge of boats by which the Persians had crossed the Danube when Darius (q.v.) invaded Scythia (513 B.C.). He refused to follow Miltiades' suggestion to destroy the bridge and in consequence was rewarded by Darius with the rule of Mitylene and with a district in Thrace. Afterward, however, when his growing power was viewed with suspicion by the Persians, he was invited to the Persian court at Susa and was detained there for 13 years. Tired of this restraint, he secretly instigated, says Herodotus, the revolt of the Ionian Greeks (see **IONIA**), but was sent by Darius to suppress it, because Histiaeus persuaded the King that he alone could crush the revolt. With his freedom thus recovered he openly made war against the Persians, but was defeated, and finally beheaded by Artaphernes.

His head was sent to Darius, who received it with sorrow and buried it with honors. Herodotus' statement that Histiaeus alone caused the Ionian revolt has been met by evidence that as early as 512 B.C. the Ionians had been preparing for the revolt. Consult Heinlein in *Klio* (1909).

HISTOGENESIS. See **HISTOLOGY**.

HISTOIRE COMIQUE DE FRANCION, è'stwär' kō'mèk' de frän'syōn' (Fr., Comic History of Francion). A romance by Charles Sorel de Sauvigny (1622), published under the pseudonym of Nicolas du Moulinet. The chief interest of the story is in the information which it supplies of contemporary customs and in the fact that it is one of the few realistic novels of the seventeenth century. It met with much success, but was always disavowed by its author.

HISTOL'OGY (from Gk. *ἱστός*, *histos*, web, from *ἱστάναι*, *histanai*, to stand + *-λογία*, *-logia*, account, from *λέγειν*, *legein*, to say). That branch of biological science which treats of the microscopical structure of living organisms, both animal and vegetable. The histology of plants belongs to the domain of botany, that of animals to the domain of human and comparative anatomy. Just as gross anatomy is subdivided into normal anatomy and pathological anatomy, so histology may be subdivided into normal histology and pathological histology. The term "histology" when unqualified is usually accepted as referring to normal histology.

History. Although the study of the microscopic structure of plants and animals may be traced to the times of Malpighi (1628-94), who discovered the blood corpuscles, Robert Hooke, who was the first (1667) to describe plant cells, and Leeuwenhoek (1632-1723), who with comparatively imperfect optical means practically laid the foundations of our knowledge of the minute structure of the tissues, no definite progress in histology as a science was made until the beginning of the nineteenth century, when the compound microscope began to assume its present improved form. The great work of Bichat, entitled *Anatomie générale appliquée à la physiologie et à la médecine* (1801), marked an epoch in the development of the science of histology. Although he apparently did little actual work with the microscope, he brought to bear upon the achievements of other investigators the power of his generalizing mind and was the first to classify tissues according to their structure. After Bichat came an epoch of histological research, during which the microscopic observations of Malpighi and Leeuwenhoek were extended in accordance with the general system of Bichat. The next great step forward was made by two botanists, Hugo von Mohl and Schleiden, who discovered the cellular basis of all plant structure. The discovery of the method of combining lenses so as to render them achromatic gave a new impulse to the study of histology, and a more perfect classification of the tissues of the body was the result, as it placed in the hands of Schwann an instrument which enabled him to demonstrate the law that all animal as well as plant tissues are composed of and develop from cells. Schleiden had already demonstrated this, which may be called the greatest discovery in histology, and therefore he and Schwann are often called the founders of the science of histogenesis, or the study of the origin of tissues, more recently pursued with great success by Reichert, Kölliker, Remak, and others. Then the microscopic

anatomy of diseased structures and their mode of development came to be investigated, and the science of pathological histology took its rise. Johannes Müller is regarded as the father of this branch of histology, as he indicated the general direction in which the investigation of diseased growths should be pursued. Afterward Virchow published his celebrated *Cellular Pathology*, and later the science was still further enriched by the labors of Billroth, Rindfleisch, Von Recklinghausen, Cohnheim, and others.

HISTOLOGY OF ANIMALS

Cells. The histological basis of the body structure is the cell. In general terms all tissues may be said to be composed of cells of one kind or another, and these cells are always combined with more or less intercellular substance. This intercellular substance may be very small in amount, as in the epithelial tissues, where it amounts to nothing more than a cementing material holding the cells together, or it may make up the greater part of the tissue, as in some forms of connective tissue. Cells differ in shape. They may be round, oval, cuboidal, spindle-shaped, or irregularly stellate. The intercellular substance differs greatly in structure, and it is upon the differences in density of the intercellular substance that the different degrees of hardness depend. Thus, in mucous tissue the intercellular substance is soft and gelatinous, in cartilage it is dense and firm, in bone it is infiltrated with lime salts and is extremely hard. It was at first believed that a cell was a little bag filled with fluid; hence its name. Most animal cells are, however, small masses of living matter, called protoplasm, having, as a rule, no cell wall. Cells may or may not have nuclei. It is probable that nonnucleated cells are incapable of performing certain of the higher functions of cells, e.g., that of reproduction.

All adult tissues and organs originate in the elementary layers of the embryo. What determines the lines of growth of these different cells, and why some develop to form one kind of tissue, others to form other kinds of tissues, is as yet beyond our knowledge. There are two modes of cell growth or reproduction—direct cell division and indirect cell division, or mitosis.

Tissues. The tissues of the body fall into four great groups: (1) epithelial tissue; (2) connective tissue; (3) muscular tissue; (4) nervous tissue. It is by combinations of these tissues that the different organs of the body are formed. The most widely distributed of the tissues is connective tissue, which in its various forms, as fibrous tissue, elastic tissue, cartilage, bone, etc., makes up the framework of the body. In combination with one or more of the other tissues it forms the various organs of the body, acting as their supporting framework. Thus, in the nervous system such organs as the brain and cord consist of nervous tissue held together and supported by the peculiar form of connective tissue known as neuroglia. A muscle consists of muscle tissue bound together by connective tissue; and the various glands of the body, such as the liver or pancreas, consist of a glandular epithelium peculiar to the particular organ held together by connective tissue. See **CONNECTIVE TISSUE**.

Consult Delafield and Prudden, *A Text Book of Pathology* (9th ed., New York, 1911). The

histology of the different tissues and organs may be found described under such titles as **CONNECTIVE TISSUE; MUSCLE; EPITHELIUM; NERVOUS SYSTEM; LIVER; KIDNEY; ETC.** See also **CELL; BLOOD**.

HISTOLOGY OF PLANTS

Cells. Many plants consist of only a single cell; nevertheless such plants show almost infinite variety in form. The simplest are nearly spherical, but in the desmids and diatoms almost every conceivable shape is to be found, and a high degree of differentiation is attained. When cells divide in only one plane and do not separate after each division, a chain of cells results; when division takes place in two planes, a plate of cells is formed; divisions in three planes give rise to a body several cells in thickness. In the last case considerable differentiation is likely to follow; the cells on the outside become adapted to the work of protection and absorption, some of those on the inside perform the nutritive functions, and others are specially modified for conducting materials. Even in the algae and fungi there is a division of labor—some cells being modified for the work of protection and absorption, others for conduction, still others for reproduction. In the liverworts and mosses the specialization is carried still further, but it is in the ferns and flowering plants that difference in structure and division of labor finds its highest expression. Such differentiation of cells in form and function gives rise to tissues.

Tissues. A tissue is a group of connected cells of like origin and structure. Tissues are therefore classified according to the form of their component cells, the thickness and chemical composition of the cell walls, the character of their contents, etc. All cells of a very young plant are alike in having thin walls, abundant protoplasm, minute vacuoles or none, and relatively large nuclei. Such cells constitute embryonic, formative, or meristematic tissue, which is found in the higher plants in three places: (1) at the tips of the shoots and roots, where it constitutes the "growing points," protected in the shoot by overarched leaves which form a bud, and in the root by the root cap; (2) one or more thin layers concentric with the stem, by which new layers of wood, cork, and bast are added to it internally; (3) where wounds are made, in which cases the meristem produces tissues that heal the wound.

In all the higher plants tissues are grouped in such a way as to form tissue systems. (See **MORPHOLOGY IN PLANTS**.) Those there described are reduced to three by some: viz., (1) the tegumentary (equivalent to the protective); (2) the vascular (equivalent to the conducting and in part the mechanical); (3) the fundamental, a sort of limbo to which are assigned all the tissues not included in the other two systems. Of all tissues it may be remarked that the cell walls are subject to thickening as they grow older. This thickening consists of material added to the surface of the primary wall. The successive additions are frequently unlike and in the mature wall are apt to be distinctly stratified. The thickening is seldom uniform. Sometimes minute regions escape thickening and remain as small pits in the added layers. These pits occur at points where the protoplasm of one cell has not been com-

pletely separated from that of the other by the formation of a partition wall, but remains connected there by many very slender strands. In other cases the thickening is absent from wider areas. This leaves broader and shallower pits, which are symmetrically or irregularly distributed and give the appearance of sculpturing of the wall (2, Fig. 1). When the thicken-

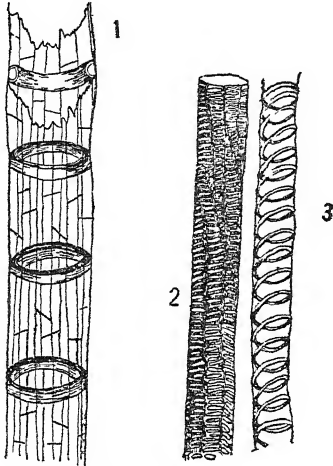


FIG. 1. TRACHEAE.

1, annular; 2, pitted; 3, spiral.

ing is restricted to spiral lines or rings, the thin walls seem to be merely supported by the thickened portions, as in spiral and annular vessels (1, 3, Fig. 1).

Only the more important kinds of tissues are here described. 1. *Parenchyma*. Cells of very various form, but mostly nearly equal in the three dimensions, usually with a thin cellulose wall containing (so long as they are functional) living protoplasm, and almost invariably separating more or less from one another to form intercellular spaces. In elongated organs parenchyma cells are likely to become elongated. The parenchyma of the leaf and the cortex of the stem may develop into very irregular forms (Fig. 2). In water plants and others in which the parenchyma develops extensive in-

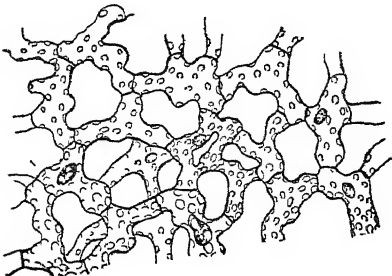


FIG. 2. IRREGULAR PARENCHYMA.

From a leaf, with only chloroplasts and nuclei shown.

tercellular spaces (aërenchyma) the cells may become branched, some even being regularly stellate (Fig. 3). Parenchyma cells sometimes have thick walls and thus form a transition to the sclerenchyma (see below), from which, however, they may be distinguished by the presence of living cell contents and sometimes reserve

food. Such parenchyma occurs in the rhizome of many ferns. Parenchyma forms the chief nutritive and storage regions of all plants and is especially abundant in herbaceous plants. In fleshy leaves, fruits, stems, etc., the parenchyma is greatly developed at the expense of other

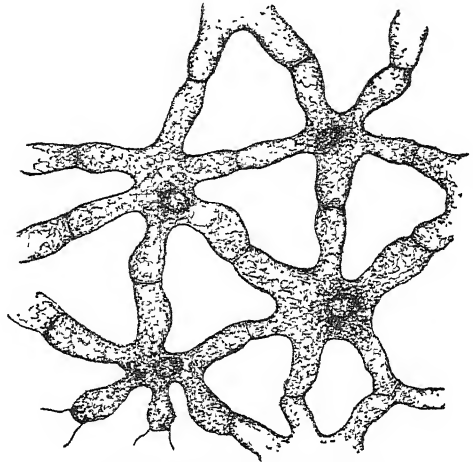


FIG. 3. STELLATE PARENCHYMA.

From stem of *Juncus*.

sorts of tissue and is there used for storage of reserve food. The outer walls of parenchyma cells, which form the surface (i.e., the epidermis), undergo a peculiar change, being infiltrated with cutin, by which they are rendered almost impervious to water. Parenchyma cells of tabular form arise from the phellogen, which have all their walls cutinized. They constitute a tissue known as *cork* (Fig. 4).

2. *Collenchyma* differs from parenchyma, of which it is hardly more than a variety, in the

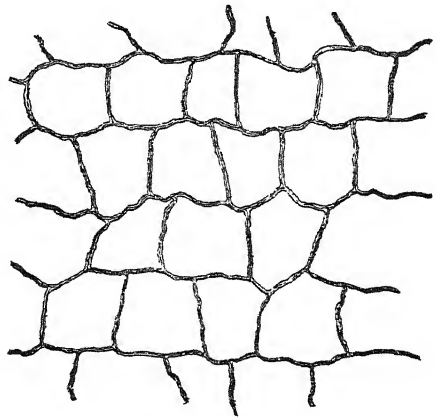


FIG. 4. CORK TISSUE.

Longitudinal section from bottle cork.

elongation of the cells, the absence of intercellular spaces, and the thickening of the angles of the cells where three or more walls join (Fig. 5). These thickened parts are more highly refractive than other parts of the wall and have a very peculiar bluish-white lustre. Collenchyma occurs only in elongated organs (stems, petioles, etc.), where it forms a strengthening tissue beneath the epidermis.

3. *Sclerenchyma* occurs in two forms, in one of which the cells have their three dimensions almost equal; in the other they are greatly elongated (Fig. 6). In both the wall is excessively thickened, sometimes so much so that the lumen is nearly obliterated. In all cases the proto-

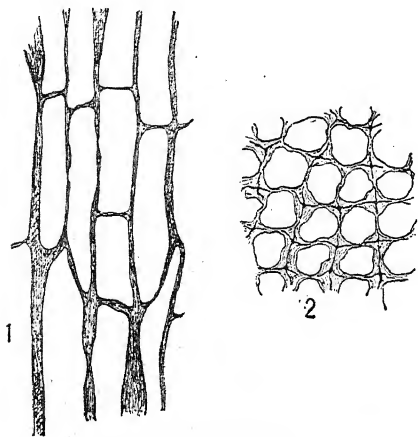


FIG. 5. COLLENCYMA.

1, longitudinal section; 2, transverse section.

plasm disappears at maturity, and the tissue is of use to the plant only by its mechanical strength. The short-celled sclerenchyma is common in the stone fruits (peach and cherry), in the shell of various nuts, in the gritty parts of the flesh of pears, quinces, etc., and in the hard portions of bark, many dry fruits, and seeds. Elongated sclerenchyma cells are most abundant in stems and leaves, in which they form continuous strands or bands, closely associated with the vascular bundles. They are often called bast fibres, but do not always belong to the bast or phloem bundles. The individual cells taper

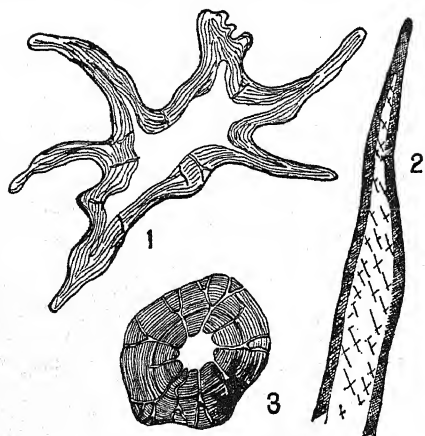


FIG. 6. SCLERENCHYMA.

1, irregular form (idioblast) from leaf of tea; 2, surface view of a fibre showing tapering end and oblique pits; 3, transverse section of a fibre showing concentric structure of wall with pore pits.

at each end, the ends of adjacent cells above and below overlap, and thus give to the strands great flexibility and a tensile strength which in many cases exceeds that of the best steel. The cells are relatively very long, 1 to 4 millimeters in jute, 10 millimeters or more in hemp, 20 to

40 millimeters in flax, and as much as 220 millimeters in ramie, with diameters from 0.01 to 0.4 millimeter. The strands of sclerenchyma fibres constitute the so-called fibres of commerce, the finer ones of which are used for textile fabrics and the coarser for cordage, etc.

4. *Tracheæ* and *tracheids*. Tracheids are usually elongated cells, whose walls have become lignified (by which they are made very

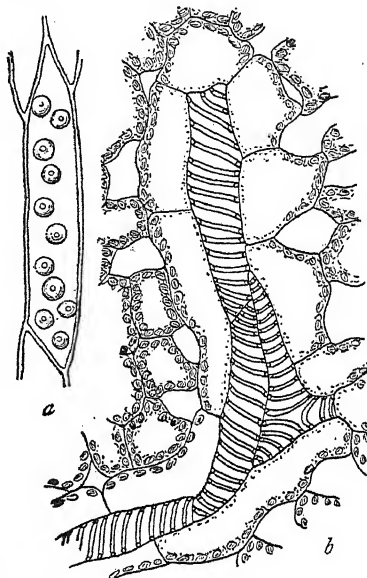


FIG. 7. TRACHEIDS.

a, from stem of pine; b, forming the termination of a xylem bundle in a leaf of *Impatiens parviflora*.

pervious to water) and thickened in spiral or annular lines or in reticulate patterns (Fig. 1). At maturity the protoplasm disappears, leaving only the cell wall of service to the plants. Tracheæ are similar to tracheids in the sculpturing of their walls, but instead of being single cells they are formed by the fusion of a row of cells lying originally end to end, the end walls being resorbed as the lateral walls thicken and the protoplasm disappears. At maturity the long empty tubes thus formed show little trace of the cells from which they originated. In angiosperms they constitute the greater part of the xylem bundles, changing to tracheids as the bundles grow smaller and come to an end (Fig. 7, b). But in gymnosperms (pines and their allies) tracheæ are formed only in the primary xylem, almost all the secondary xylem being tracheids with characteristic circular-bordered pits (Fig. 7, a). Tracheæ and tracheids are the most efficient tissues for the transport of water in the larger plants.

5. *Sieve tubes* are cell fusions formed by the partial resorption of the end walls of a row of young cells. The end partitions and sometimes the lateral walls which adjoin other sieve tubes become perforated, forming a so-called "sieve plate," through which the contents of the sieve tubes (a slimy mixture of soluble proteins, carbohydrates, and other foods) pass freely. Sieve tubes are found in the phloem bundles, in which they constitute the most efficient tissue for the transport of foods (Fig. 8). See SIEVE VESSELS.

6. *Latex tubes* are long, much-branched tubes,

with free or anastomosing branches, which contain the milky or colored sap in certain plants. There are two sorts, articulated and nonarticulated. A nonarticulated tube arises by early differentiation of certain cells in the embryo, which push their way among the other develop-

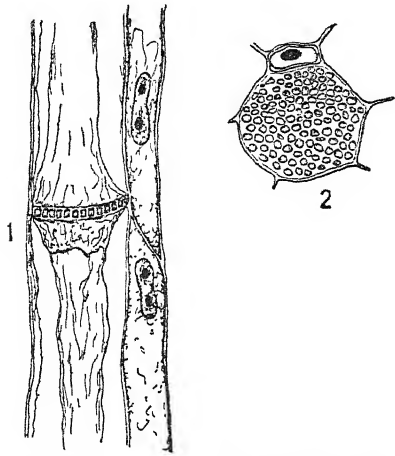


FIG. 8. SIEVE TUBE AND COMPANION CELL.

1, in longitudinal section; 2, in transverse section showing a sieve plate.

ing tissues by independent growth. The articulated tubes arise by the fusion of rather indefinite rows of cells, either longitudinal or transverse, which form a network of irregular tubes. Latex tubes are found in the phloem bundles, or just outside these bundles in the cortex of stems, and accompany them into the leaves, where they ramify widely. Their terminals come into close relation with the nutritive cells. (See Illustration under LATEX.) They seem to constitute a transportation system for foods. See GROWTH, IN PLANTS; ANATOMY OF PLANTS; CELL, IN PLANTS; ROOT; STEM; CONDUCTION; LATEX.

HISTOLOGICAL TECHNIQUE

The methods of histological observation were at first extremely crude, consisting merely in tearing apart the tissues and examining them under the microscope. Such handling, of course, largely destroyed the relations of the different elements of the tissues to one another. The cutting of thin sections of tissue with a razor was soon introduced, this being much facilitated by the previous hardening of the tissues in some suitable solution. Such sections were, however, difficult to study, owing to their transparency and the fact that the different tissue elements possess nearly the same index of refraction. The staining of sections was the next great improvement in technique. At first a single stain was used, the denser elements taking a darker shade than those of less dense structure. The discovery of what is known as differential staining, whereby the different tissue elements are stained different colors, and the introduction of an instrument for section cutting, known as the microtome (see further below), together with improvements in the microscope, have been the main factors in the recent rapid development of the art. At present the most commonly used technical procedure in the examination of tissues and organs is as follows:

The first step is *fixation*. By this is meant a rapid killing of the tissue in such a way as to allow it to retain as nearly as possible the same form and relation as does the living tissue. Among the more common fixatives may be mentioned alcohol of various strengths, formalin in from 5 to 20 per cent solutions, osmic acid, usually in 1 per cent solution, Müller's fluid (2.5 grams of potassium bichromate and 1 gram of sodium sulphate, dissolved in 100 cubic centimeters of water), Fleming's fluid (a mixture of osmic, chromic, and acetic acids in water), chromacetic acid (1 per cent solution in water), and corrosive sublimate in saturated aqueous solution. Many other fixatives are used for special purposes; thus, osmic acid is employed for the demonstration of fat and myelin. The small slices of tissue employed are allowed to remain from 12 to 48 hours in a large amount of fixative. Tissues which have been fixed by any other agent than alcohol are then subjected to prolonged washing with running water. The next step is *hardening*. Fixing solutions are also hardening agents if allowed to act sufficiently long. Many fixatives, however, have a detrimental effect upon the tissues if their action is too prolonged. It is, therefore, quite common to transfer the tissues after proper fixation to some new fluid for the purpose of hardening and preservation. The almost universal hardening and preserving agent is alcohol, but formalin, too, in from 5 to 10 per cent aqueous solution, is now extensively used. The first alcohol bath for plant tissues should be 35 per cent or weaker, while many animal tissues will stand 50 per cent. This should be followed consecutively by 50, 70, 90, and 97 per cent alcohol. For long preservation 80 per cent alcohol is the most satisfactory. Next in the process is *embedding*. By this is meant the impregnation of the tissues with a liquid which afterward hardens, thus holding the tissues in a firm mass, which can be easily cut. For this purpose paraffin and celloidin are most commonly used. In paraffin embedding the tissue is first immersed in any pure solvent of paraffin, then passed to a warm solution of paraffin in the solvent, and finally left in pure melted paraffin until thoroughly impregnated. In celloidin embedding the tissue is transferred from alcohol to a mixture of alcohol and ether and then placed in a solution of celloidin in a mixture of equal parts of alcohol and ether. After impregnation the paraffin is allowed to harden by cooling, or the celloidin to thicken by exposure to the air and consequent evaporation of the alcohol and ether, after which it is immersed in chloroform for hardening. The operator then proceeds to cut sections by means of the microtome. This instrument consists essentially of a knife carrier, which can be made to slide back and forth past a clamp to which the specimen is attached. The embedded specimen is fastened to a block, usually of wood, clamped in the microtome. The clamp is so arranged that the blocked specimen can be raised any desired fraction of a millimeter, thus bringing any thickness of it above the knife. In paraffin cutting the knife is kept dry; in celloidin section cutting it is kept flooded with alcohol. The sections are then stained for the purpose of bringing out sharply the different tissue elements. For staining the nuclei, carmine, hæmatoxylin, and various aniline dyes are commonly used. For demonstrating the other tissue ele-

ments other dyes may be used, eosin being much employed. The procedure in staining celloidin sections with hæmatoxylin and eosin is as follows: The sections are first allowed to remain for several minutes in an aqueous solution of hæmatoxylin; then they are thoroughly washed with 97 per cent alcohol and placed for several minutes in an alcoholic solution of eosin; they are then again washed in alcohol and cleared in oil of origanum or bergamot containing a little eosin. From the clearing bath the specimen is lifted to a glass slide, the excess of oil is removed by means of blotting paper, a drop of a solution of Canada balsam is placed upon the specimen, and the whole is covered with a thin glass, called the cover glass. By the drying and hardening of the balsam a permanent "mount" of the specimen is secured.

The above methods of procedure are illustrative of those applicable to general histological material. The examination of special tissues and organs requires the use of special methods of technique. This is especially true in regard to the nervous tissues, for the study of which some very elaborate methods have been devised, some of which will be found described in the article NERVOUS SYSTEM.

For histological methods as applied to plant tissues, consult C. J. Chamberlain, *Methods in Plant Histology* (2d ed., Chicago, 1905), and Eduard Strasburger, *Handbook of Practical Botany* (7th ed., New York, 1911); for methods in animal histology, consult A. B. Lee, *Microtome's Vademecum* (6th ed., Philadelphia, 1905), and F. R. Bailey, *Text-Book of Histology* (4th ed., New York, 1913).

HISTONIUM. See FRENTANI; VASTO.

HISTORIA AUGUSTA. See AUGUSTAN HISTORY.

HISTORICAL ASSOCIATION, AMERICAN.

A society of historical students and writers, founded at Saratoga, N. Y., in September, 1884, at the suggestion of Herbert B. Adams, of Johns Hopkins University. Its original membership was 40, but within a year it had increased to 250, and in 1889 it received a definite standing and recognition by an Act of Congress incorporating it in the District of Columbia. The society has exerted wide influence in directing and stimulating historical research, and its publications and monographs have covered a broad field of historical study. The American Society of Church History, founded in March, 1888, became in 1896 the Church History Section of the American Historical Association, but regained its independence in 1904. Important committees of the society are the Historical Manuscripts Commission, which prepares valuable manuscripts for publication, and the Public Archives Commission, concerned in the preservation of public records. The society holds annual meetings, publishes an annual report through the Smithsonian Institution, and appoints a board of editors for the *American Historical Review*, published quarterly. The society has published five volumes of *Papers*, some 40 volumes of *Annual Reports*, a series of prize essays, two volumes on *The Study of History in Schools*, secondary and elementary, and a series of reprints of *Original Narratives of American History* in 20 volumes.

HISTORIC GEOLOGY. See GEOLOGY.

HISTORY (Lat. *historia*, Gk. *ιστορία*, history, from *ιστωρ*, *histōr*, learned, from *εἰδέναι*, *eidenai*, Skt. *vid*, OHG. *wizzan*, Ger. *wissen*, to

know). A systematic narrative of past events, or, in the light of modern historical scholarship, the science of the progressive development of human society. The social and economic conditions of peoples, their racial affinities and physical environment, exercise determining influences upon their history and find expression in their thought, their art, and their politics. History deals with the social structure in its successive forms and recognizes as inseparable allies all sciences which contribute to a knowledge of man as a social being and in his relation with the physical world.

As a science, history is primarily inductive. It proceeds from a body of concrete facts, which critical study links together according to the sequences of time and causation. Afterward deductive processes may be used, but always sparingly and cautiously.

Historical method comprises four processes: the collation of facts; the arrangement of these facts according to the sequences of time and causation; criticism, by which the value of the facts is determined; and their interpretation in accordance with the results of arrangement and criticism. These processes are all simple; they are the ordinary processes of scientific research, but in carrying them out the human equation becomes so large an element of the problem as to make it essentially different from the problems of the physical world, and for this reason history can never be an exact science.

History depends upon human evidence, and its investigation must follow the laws governing the reception of human evidence. These are found to a considerable extent in the body of principles developed by jurisprudence for the reception of evidence in the courts. The historical material is contained in several categories: (a) Remains, such as buildings, walls, roads, statues, pictures, medals, coins, implements—whatever, indeed, man has made and used and which may thus throw light upon his civilization and his deeds. These may be studied directly, when accessible, or through the reproductions easily obtainable by means of modern processes.

(b) Documents. Under this head are included official and business papers and letters written with an immediate practical purpose.

(c) Literatures. This class includes a great body of material of the highest value—the writings through which are expressed the ideas of the peoples, their philosophy, poetry, science, and religion.

(d) Traditions. Much of this class is preserved in the literatures; much of it must be gathered from other sources.

(e) Laws. These, especially public law, are found in codes and treatises and are of great value in determining many questions.

(f) Contemporary writings with historical purpose—annals, chronicles, biographies. Under these heads can be classified the original material on which secondary historical work, the written history of a nation or an age, is based and by examination of which its accuracy must be tested.

This material may also be divided into two great classes of evidence—conscious and unconscious. It will be seen that some of this material must have been prepared consciously to influence the opinion of contemporary or succeeding generations. In this class are proclamations, statements, writings, narratives, told with intention concerning events within the narrator's own knowledge, or reported to him by others.

Such evidence must be taken with qualifications attaching to all *ex parte* testimony. On the other hand, the evidence may be given unconsciously, as in documents of record, writings or other remains, prepared with no other purpose beyond that of direct utility. A striking example of this class of evidence is found in the little cylinders and tablets of clay, preserving in the business records, impressed upon them in cuneiform characters, so much of the social history of the Babylonians of thousands of years before the Christian era. All these materials of human history must be subjected to searching inquiry as to their original purpose and the circumstances under which they were made. The development of history into scientific form has been the work of ages and owes its final impulse to the great improvements in methods in the physical sciences during the eighteenth and nineteenth centuries, although it developed along with the development of the human society whose life it records. The historical idea requires for its existence a background and a consciousness on the part of society of itself and of its continuity; of its relations to a past and a present. The growth of this social self-consciousness has been a matter of time. It is interesting to notice, on the other hand, how the study of their history has sometimes aroused in a people the consciousness of their own national life, which before was dormant. An example of this may be found in the Balkan states, which were roused not many years ago into determined revolt against Turkish rule by the teaching of their national history through the efforts of a few patriotic scholars.

The new outlook upon the natural world given by the physical sciences and the change in historical methods gave rise to a controversy in the last century, in which certain philosophical thinkers of the highest ability undertook to maintain that "human actions are governed by laws as fixed and regular as those which rule in the physical world." Auguste Comte, Henry Thomas Buckle, and Herbert Spencer are the distinguished sponsors of this theory. Buckle, in his *History of Civilization in England*, the first volume of which was published in 1857, elaborated this idea with a profundity of learning, but with much inconsistency of reasoning. Such literary historians as Charles Kingsley and James Anthony Froude entered the discussion on the other side, and John Stuart Mill, in his *System of Logic*, made a very sane and able contribution to it. The strongest and most extreme presentation of the opposite side of the controversy is, perhaps, that made by Froude in his lecture of 1864 on "The Science of History." He maintained with great eloquence that the determination of human movements upon any basis of scientific accuracy was impossible. This old controversy is closed now in the light of a better understanding of what the science and scientific method really are, but it is of interest historically as marking one stage in the development of the science of history.

The development of history down to the nineteenth century may be traced through the work of a very few writers and scholars. The first of all historians was the Greek Herodotus, who lived in the fifth century B.C. He was, however, only a narrative writer, recording with great accuracy those events which came within the scope of his personal knowledge, but mingling with his narratives much which came to him only by

hearsay, and to which he applied no critical canons. Thucydides, the next of the great historians, is justly estimated as one of the greatest historians of all time. He recorded events with remarkable conciseness and first applied philosophical reasoning to the historical narrative. Among narrative historians the accomplished Xenophon deserves a place. Polybius, with a wider outlook, followed in the footsteps of Thucydides. Of the Romans, Cæsar, Livy, and Tacitus show a high development of the historical sense—the two former confining themselves to the narrative field, and the last claiming a place in the class of historians like Thucydides, who endeavored to find the meaning of history beneath the mere sequence of events. The historians of the later Roman Empire were for the most part apologists for or eulogists of the emperors who were their masters and establish no landmark of importance. During the Middle Ages there was no historical writing worthy of the name in Europe. The historical writing of the time is contained in the annals and chronicles preserved in the monasteries, which were very little more than diaries from day to day, kept without any discrimination by men whose outlook upon the world was of the narrowest. Einhard in the reign of Charlemagne, Otho of Freising in that of Frederick Barbarossa, and a few others, alone rise a little above the dead level, which offers material for historical research, but no true history. The awakening of a broader and more vigorous scholarship in the period of the Renaissance produced a new school of political and historical thinkers, who built upon the revived classical models. They are found in Italy, where Machiavelli and Guicciardini wrote historical works that are admirable in thought and style, and in France, Spain, and England, where the example of Italy was followed as in other fields of culture. In the eighteenth century the Englishman Gibbon, who devoted his life to his great work, *The Decline and Fall of the Roman Empire*, left one of the masterpieces of historical scholarship—a work that stands to-day as the most thorough and scholarly presentation of the history of the later Empire and of the Middle Ages. Voltaire, Hume, Montesquieu, and Robertson are brilliant names in the progress of historical thought of the same century. It remained, however, for the nineteenth century to develop history into a systematic science. With Niebuhr began a rational study of classical history, which has been carried on by Mommsen and Curtius for Roman and Greek history respectively. The greatest impulse, however, for the study came from the classrooms of Leopold von Ranke (1795–1886). Ranke grasped the fundamental idea of historical science with a rugged sincerity, both of theory and practice, and impressed his spirit upon a large body of enthusiastic students in Germany and America. Waitz, Droysen, Von Sybel, Von Holst, Treitschke, and others have followed with greater or less ability along the path over which he led the way. In France within the last half century historical work and instruction have developed with great rapidity, and Monod, Duruy, Henri Martin, Lavis, Rambaud, and many others have exemplified the French genius for clear and scientific thinking and for condensed lucidity of statement. In less degree the other continental countries have contributed to the development of the science. In England, along with such brilliant literary historians as Macau-

lay, Kingsley, and Froude, we have a body of eminent scientific scholars, of whom Freeman, Green, Stubbs, Creighton, and Gardiner are distinguished representatives. In America, whose scholars have drawn largely from the German and French schools, there has also been a noticeable development in historical writing and in critical scholarship. Succeeding the earlier school, which included Bancroft, Prescott, and Motley, there has grown up in the United States a modern school, trained in the best university methods of research, and enrolling in different kinds of historical work hundreds of vigorous and enthusiastic scholars. Francis Parkman, Justin Winsor, and John Fiske left behind them a body of historical writings of a very high order. Henry Adams, James Schouler, Captain Mahan, John Bach McMaster, and James Ford Rhodes are contemporary American historians whose studies in the history of their own country are of permanent value, and many more names might be added. From the lecture rooms and seminaries of Europe and America a constant impulse to wise and thorough study and use of historical material goes forth from earnest and able teachers. Numerous periodicals are devoted to the advancement of historical research. Most noteworthy of these are the *Historische Zeitschrift* in Germany, the *Revue Historique* in France, the *English Historical Review* in England, and the *American Historical Review* in the United States.

It is the tendency of the modern school of historical students to rely more upon the thorough study of true sources of history, rejecting the myths, traditions, and second-hand accounts, which have so often formed much of the material of writers of so-called history. Collections of written sources form a very considerable part of the historical publications of to-day, and guides and commentaries to these collections of sources are constantly being issued to enable the student to find his way intelligently through the mass of material which the source collections present. In this direction Germany, under the leadership of Ranke, led the way. The massive and constantly growing collection of sources of German history, known as the *Monumenta Germaniae Historica*, is in itself a monument of scholarship and research, and in France, England, and the United States similar collections have been published and are in process of publication from year to year. The well-known *Rolls Series* in England is nearly as notable a collection as the German *Monumenta*. Even in historical instruction in the schools, the simpler and more interesting sources have been put in available form for elementary students and are used with great success to enliven the historical narrative and to give an appreciation of the true nature of historical research. This tendency to explore the actual evidence critically has done much to clear history of the fables, myths, and traditions which made much of it unreliable and to render it real to the student. However, the mere application, no matter how arduous, of the scientific method to great masses of material is inadequate for writing history; but with this application the success of the writer will be in proportion to his own measure as a man, which will be reflected in his power to image the thoughts, feelings, beliefs, hopes, and pleasures of the people of the past. This is only another way of saying that history should partake of both science and literature.

Divisions of History. History is commonly divided chronologically into three great periods—Ancient, Mediaeval, and Modern. While there is complete continuity in the course of history, each one of these periods has certain characteristics distinguishing it from the others and making it convenient to treat each as a unit. In the first period the beginning and growth and decline of the great civilizations of antiquity are comprised. Here are considered the old East, Egypt, Mesopotamia, and Syria, Greece, and Rome. In these remote ages were laid the foundations of civilization, the elements of which were handed on from the valleys of the Nile and Euphrates to the Greeks and Romans, who fashioned them into instruments available for later generations. The Roman Empire welded together all the diverse elements of the ancient world. Ancient history is usually regarded as ending when the irruption of the Germanic barbarians from northern and central Europe into the highly developed Roman civilization caused the downfall of the old Empire in the fifth century of our era and ushered in several centuries of confusion. The world that had been so thoroughly organized by the Roman was materially modified in its structure by the individualism for which the German stood, in contradistinction to the principle of Imperial unity emphasized in the Roman world. Out of this stormy mingling of conflicting ideas in the Middle Ages came modern Europe, which rests politically upon a combination of the German and Roman principles. The Middle Ages are regarded as closing about the end of the fifteenth century, when the fall of Constantinople had removed the last shadow of the old Roman world, when the discoveries of Columbus had immeasurably widened the European horizon, and the revolt was beginning against ecclesiastical imperialism. The national idea slowly took form out of the feudalism of the Middle Ages, and modern nations gradually arose, with the result of bringing into being a legal code for the regulation of international relations. The internal confusion of the Middle Ages had separated Europe from the rest of the world, but with the revival of learning and the interest in new things, known in history as the Renaissance, came a larger acquaintance with that older world of the East which, while less progressive, had its own civilization, institutions, and history. The conflict of the religions and civilizations of the East and West produced the Eastern Question, in which are contained so many of the most difficult problems of modern international politics. The opening of the New World in the period of discovery introduced a new factor of the greatest importance in the world's history—the future great power of the Western Hemisphere, which had as its heritage the civilization of Europe, but was unhampered by immemorial traditions and institutions and by conflicting national interests. The same pregnant era that saw these new elements thrown into the world's life saw also the renewal of the old conflict between the German idea of liberty and the Roman idea of unity in the Protestant revolt against the control of the Roman church. This conflict shaped much of the world's history for three centuries. The expansion of population in the older countries, the development of commerce, the increasing knowledge of the world, and the growing ambition of nations conscious of their own possibilities and increas-

ing rapidly in power and wealth, together with the religious persecutions generated by the Protestant revolution, brought about the opening and settlement of new and hitherto inaccessible regions, resulting in the widening of national interests, enormous increase in the power and resources of the great nations, and a development of national rivalries on a scale hitherto unknown. There has also come an insistence on the part of civilized peoples that barbarian races shall submit to civilization and not obstruct the progress of world development. History has until recently concerned itself almost exclusively with the Occidental nations, regarding the Orient only as it has come in contact with the West. Now, however, the histories of India, China, Japan, and all other peoples that have enjoyed organized life have assumed importance in view of their bearing upon the larger problems of the age. Such has been the movement of the great current of history which has expanded in volume with the expansion of the race. Within these wide boundaries the histories of different countries may be studied in detail; and the study of history may be still further specialized along the lines of social, economic, political, or constitutional fields, or in those of art, literature, or thought. These special fields become increasingly important as history grows in complexity, so that light is needed upon its phases in detail.

Bibliography. The true spirit of history is nowhere better expressed than in R. W. Emerson's essay on *History*. See also Frederic Harrison, *The Meaning of History* (London, 1894); Lord Acton's inaugural address as regius professor at Oxford (ib., 1895); C. W. Smith, *Lectures on the Study of History* (Oxford, 1865); G. S. Hall (ed.), *Methods of Teaching History* (Boston, 1883-85); E. A. Freeman, *Methods of Historical Study* (London, 1886); J. G. Droysen, *Grundriss der Historik* (Boston, 1893); J. A. Froude, *Short Studies on Great Subjects* (New York, 1893); Ernst Bernheim, *Lehrbuch der historischen Methode* (Leipzig, 1894); Langlois and Seignobos, *Introduction to the Study of History* (New York, 1898); William Stubbs, *Lectures on the Study of Medieval and Modern History* (3d ed., Oxford, 1900); K. G. Lamprecht, *What is History?* (New York, 1905); J. F. Rhodes, *Historical Essays* (ib., 1909); W. E. H. Lecky, *Historical and Political Essays* (new ed., ib., 1910); J. H. Robinson, *The New History, Essays Illustrating the Modern Historical Outlook* (ib., 1912); G. M. Trevelyan, *Olio, A Muse and Other Essays* (London, 1913); John Morley, *Notes on Politics and History* (New York, 1914). The publications of the American Historical Association contain many papers relating to history in general in its different aspects.

HISTRIA. See **ISTRIA**.

HISTRIOMASTIX (Neo-Lat., from Lat. *histrio*, actor + Gk. *μάστιξ*, *mastia*, scourge). A comedy produced not later than 1599, of which John Marston was at least a collaborator, and printed in 1610.

HISTRIOMASTIX, THE PLAYER'S SCOURGE, or **ACTOR'S TRAGÆDIE**. A tract violently attacking the drama, by William Prynne, a Puritan, published in 1632.

HIT (Gk. *ἴς, ἰς*). A town of Asiatic Turkey, situated among deserts and salt marshes on the right bank of the Euphrates, in the Vilayet of Bagdad, and 80 miles northwest of the city of

that name (Map: Turkey in Asia, E 4). It is remarkable for the asphalt and naphtha pits in the neighborhood, from which asphalt is believed to have been obtained for the construction of the walls of Babylon. The chief products of the place are asphalt, naphtha, salt, lime, and gypsum. It has a shipyard and is the head of navigation of the Euphrates. Pop., about 5000.

HITA, *é'tá*, GINES PÉREZ DE. See PÉREZ DE HITA, GINES.

HITCH. See **KNOTTING AND SPLICING**.

HITCH'COCK, ALBERT SPEAR (1865-). An American agrostologist. He was born at Owosso, Mich., and was educated at the Iowa State Agricultural College (B.S., 1884; M.S., 1886). He served as an instructor at the State University of Iowa in 1886-89, as an assistant at the Missouri Botanical Garden, St. Louis, in 1889-91, and as professor of botany at the Kansas Agricultural College from 1892 to 1901. He became assistant agrostologist in 1901 and agrostologist in 1905 of the United States Department of Agriculture. His investigations deal especially with the taxonomy of grasses. He was president of the Botanical Society of America in 1914.

HITCHCOCK, CHARLES HENRY (1836-). An American geologist, the son of Edward Hitchcock. He was born at Amherst, Mass. After graduating at Amherst College (1856), he was assistant to the Geological Survey of Vermont (1857-61); State geologist of Maine (1861-62) and of New Hampshire (1868-78). His three-volume report on his work in New Hampshire, containing a folio atlas of maps, profiles, and sections, is considered his most important publication. Incidental to the survey was the maintenance of a meteorological station throughout the year on the summit of Mount Washington, whence daily statements of the weather conditions were issued before the United States Signal Service had begun its weather predictions. From 1868 to 1908 he was professor of geology at Dartmouth College. He was vice president of the American Association for the Advancement of Science (1883), a member of the Imperial Geological Institution of Vienna, and one of the original and most active members of the Geological Society of America. He was the first to suggest the locality of the great terminal glacier in the United States. Besides some 150 papers chiefly on New England geology, he is author of *Elementary Geology* (1861), with Edward Hitchcock; *Mount Washington in Winter* (1871); *Hawaii and its Volcanoes* (1909; 2d ed., 1911).

HITCHCOCK, EDWARD (1793-1864). A scientist and educator who contributed greatly to the development and popularizing of geological science in America. He was born in Deerfield, Mass., where for a time he served as principal of the academy. From 1814 to 1818 he published the *Country Almanac* and in the latter year entered Yale Theological Seminary, from which he was graduated in 1820. After serving as pastor of the Congregational Church in Conway, Mass., he was appointed professor of chemistry and natural history in Amherst College. As president of that institution from 1845 to 1854, he improved its financial condition and greatly extended its usefulness. When he resigned the presidency, he retained the professorship of natural theology and geology, holding this office until his death. Throughout the latter part of his life he devoted much

time to geological research. In 1830 he was appointed State geologist of Massachusetts, and under his direction the first geological survey of any extensive area was completed. The results of this work were published by the State government in several voluminous reports. In 1836 he received the appointment of geologist of New York, but resigned the position. He served as geologist of Vermont from 1857 to 1861 and in 1850 was commissioned by the State of Massachusetts to examine the agricultural schools of Europe. He was one of the founders of the Massachusetts Agricultural College and of Mount Holyoke Seminary and was the first president of the American Geological Society. His extensive collection of fossil footprints of the Connecticut valley was presented to Amherst College. The most important of his works are: *Economic Geology* (1832); *Report on the Geology, Mineralogy, Botany, and Zoology of Massachusetts* (1833); *Elementary Geology* (1840); *Geology of Massachusetts* (1841); *History of a Zoological Temperance Convention in Central Africa* (1850); *Religious Lectures on Peculiar Phenomena of the Four Seasons* (1850); *Religion of Geology and its Connected Sciences* (1851); *Religious Truth, Illustrated from Science* (1857); *Ichthyology of New England* (1858); *Report on the Geology of Vermont* (1861); *Reminiscences of Amherst College* (1863).

HITCHCOCK, ETHAN ALLEN (1798-1870). An American soldier. He was a grandson of Ethan Allen, of Ticonderoga fame, was born at Vergennes, Vt., and graduated at West Point in 1817. After garrison service he was instructor in tactics at West Point (1824-27) and commandant there (1827-29). He served against the Indians in Florida in 1836 and 1840 and in the last campaign of the Mexican War. For his service in Mexico he was brevetted brigadier general (1847). He commanded the Pacific Division from 1851 to 1854 and in the next year resigned because of a quarrel with Jefferson Davis, then Secretary of War. At the outbreak of the Civil War he was appointed major general and served at first on special duty under the Secretary of War and later as commissioner of exchange. He was also confidential adviser to the President. Hitchcock was a scholar of great attainments and in expression of his peculiar philosophy wrote: *Remarks upon Alchemy and the Alchemists*, arguing that they were religious philosophers, and that truth was the philosopher's stone (1857); *Swedenborg, a Hermetic Philosopher* (1858); *Christ, the Spirit*, in which the Gospels are treated as symbolical writings of the Essenes, a Jewish secret society (1860); *Red Book of Appin, and Other Fairy Tales* (1863); *Remarks on the Sonnets of Shakespeare* (1865 and 1867); *Spenser's Colin Clout Explained* (1865); *Notes on the Vita Nuova of Dante* (1866), in all of which he gives hermetic explanations of the matter of these books.

HITCHCOCK, ETHAN ALLEN (1835-1909). An American politician and cabinet officer, born in Mobile, Ala., and educated at New Haven, Conn. He was in business for a while in China and for several years in St. Louis. In 1897 he was sent as United States Minister to Russia and subsequently was made Ambassador upon a corresponding change in the Russian diplomatic service. In 1898, upon the retirement of Cornelius M. Bliss, he was appointed Secretary of

the Interior, serving until 1907. During his term, and largely through his efforts, the gigantic system of public land frauds in the West was uncovered, and many of its participants were punished.—His brother HENRY (1829-1902) was born near Mobile, Ala., and was one of the foremost lawyers and citizens of St. Louis.

HITCHCOCK, FRANK HARRIS (1867-). An American cabinet officer, born at Amherst, Ohio. He graduated from Harvard University in 1891 and from the law department of Columbian (now George Washington) University in 1894. After practicing law and holding various less important posts in several government departments, he was First Assistant Postmaster-General from 1905 to 1908. In the latter year he managed William H. Taft's campaign for the presidential nomination, and as chairman of the Republican National Committee (1908-09) he also had charge of the campaign resulting in Taft's election. His administration of the postal system (Postmaster-General, 1909-13) resulted in a surplus of revenue over expenditures; the postal savings bank and parcel post were introduced during his term of office, and near the close of his administration he recommended government ownership of the telegraphs. He resumed the practice of law in New York City in 1913.

HITCHCOCK, GILBERT MONELL (1859-). An American legislator. He was born at Omaha, Neb., where, after studying at Baden-Baden, Germany, and graduating from the University of Michigan Law School (1881), he practiced law. He founded the *Omaha Evening World* in 1885 and in 1889, having bought the *Morning Herald*, consolidated it with the *World* under the title of the *World-Herald*. He was a Democratic member of the Fifty-eighth (1903-05) and of the Sixtieth and Sixty-first congresses (1907-11), and he became United States Senator for Nebraska for the term 1911-17.

HITCHCOCK, HENRY (1829-1902). An American lawyer, born at Spring Hill, Ala., and educated at the University of Nashville (A.B., 1846) and at Yale University (A.B., 1848). He studied law, taught in the Worcester (Mass.) High School in 1848-49, and was admitted to the bar at St. Louis, Mo., in 1851. During the Civil War he served in the Union army as assistant adjutant general, and was judge advocate on the staff of General Sherman. In 1867 he helped to organize the law department of Washington University (known as the St. Louis Law School), of which he was dean until 1881. He served also as professor in the school and continued his lectures after resigning the deanship. He was president of the St. Louis Bar Association (1880), of the Missouri State Bar Association (1892), and of the American Bar Association (1889).

HITCHCOCK, ROSWELL DWIGHT (1817-87). An American clergyman and educator, born in East Machias, Me. He graduated at Amherst College in 1836 and at Andover Theological Seminary in 1838. He preached a year in Waterville, Me., and in 1845 was installed over the First Congregational Church in Exeter, N. H. He resigned in 1852 to accept the professorship of revealed religion at Bowdoin College. Three years later he resigned at Bowdoin to become professor of Church history at Union Theological Seminary, of which he was elected

president in 1880. He was on the editorial staff of the *American Theological Review* for seven years, traveled in Egypt and Palestine, and was elected president of the Palestine Exploration Society in 1871 and vice president of the American Geological Society in 1880. He published: *The Life, Character, and Writings of Edward Robinson* (1863); *Complete Analysis of the Holy Bible* (1869); *Socialism* (1879); *Carmine Sanctorum*, with Dr. Zachary Eddy and Rev. Lewis W. Mudge (1885). A collection of sermons, *Eternal Atonement*, was published posthumously (1888).

HITCHIN, hīch'in. A market town in Hertfordshire, England, 14 miles northwest of Hertford, on the river Hiz (Map: England, F 5). It was the original seat of Girton College: it has a free school, founded 1622; and its fine old parish church of St. Mary contains an historical crypt, an excellent porch, interesting monuments, and an "Adoration of the Magi" by Rubens. The town hall and corn exchange are fine modern buildings. Hitchin has large breweries and a trade in corn, malt, and flour. Straw plaiting is carried on, and the cultivation of peppermint and of lavender for its perfumery dates from 1568. It is a large cattle market. Hitchin is recorded in the Domesday Book. It was given to Harold by Edward the Confessor and came into the possession of William the Conqueror. Pop., 1901, 10,072; 1911, 11,905.

HITOPADESA, he-tō'pā-dā'shā (Skt., salutary instruction), or Book of Good Counsel. The name of a celebrated Sanskrit collection of fables, the contents of which have passed into almost all the civilized literatures of the world. The collection itself, in the form in which we possess it, is founded on older works of a kindred nature; and its preface expressly mentions "the *Panchatantra* and another work." For a convenient list of editions and translations and a sketch of the subject, consult C. R. Lanman, *Sanskrit Reader* (Boston, 1888), and Hertel, *Ueber Text und Verfasser des Hitopadesa* (Leipzig, 1897). Two good editions with English notes are published in India by Godabole and Parab (Bombay, 3d ed., 1890) and by Peterson (ib., 1895). See PANCHATANTRA; SANSKRIT LITERATURE.

HITOTSUBASHI. See KÉIKI.

HITTEREN, hīt'er-en. An island off the west coast of Norway, situated at the entrance to the Trondhjem Fjord (Map: Norway, D 5). It covers an area of nearly 200 square miles (including some adjacent islets) and has a population of about 2500. It is covered with low but rugged hills, reaching 1000 feet, among which are numerous lakes and streams. The inhabitants are mostly engaged in fishing.

HITTITES (Heb. *Heth*, pl. *Hittim*; Bab. *Hatti*; Egypt. *H't*). An ancient Asianic people whose home seems to have been in Cappadocia, but who not only made their power felt in all parts of Asia Minor but also established themselves in Syria and Mesopotamia. Until recent times they were known only through various allusions in the Bible. The eponymous ancestor of the people, Heth, appears in Gen. x. 15 as the son of Canaan, the brother of Sidon, the Amorite, etc., indicating that the Hittites belonged to the earlier population of Syria found by the invading Hebrews, and that they were regarded as akin to the Phœnicians and the Amorites. In the list of the peoples of Canaan the Hittites are regularly mentioned; the city of Luz is

said to be in "the land of the Hittites" (Judg. i. 26); Abraham buys the Machpelah from Ephron the Hittite (Gen. xxiii. 3 ff.); Esau's wives Jehudith and Bashemath were Hittites (Gen. xxvi. 34); Ahimelek the Hittite is mentioned in 1 Sam. xxvi. 6; Uriah and probably his wife Bathsheba were Hittites (2 Sam. xi. 3 ff.); Solomon had commercial relations with the kings of the Hittites (1 Kings x. 29); there were Hittites among the foreign wives of Solomon (1 Kings xi. 1); the Aramæans besieging Samaria were afraid of the kings of the Hittites; in Ezekiel xvi. 3, 45, Jerusalem's mother is said to be a Hittite; and in Josh. i. 4 the promised land is designated as "the whole land of the Hittites." It has been questioned whether there could have been Hittites in Hebron or among the Edomitish clans, but in the light of recent discoveries there is no valid reason to doubt it.

The earliest datable reference to the Hittites in cuneiform literature comes from the Chronicles of Babylonian Kings, published by King in 1907, recording that in the time of Samsuditana (c.1932 B.C.) "the Hittites came to the land of Akkad." The dynasty was probably overthrown by the Hittites, under whose suzerainty the first kings of the next dynasty of Babylon seem to have ruled. (See BABYLONIA.) But several centuries before this time the earliest-known rulers in Assur, Uspia and Kakkia, seem to have Hittite names, and the Assyrian invasion of Asia Minor of which the Cappadocian tablets give testimony is likely to have been a reaction against this early occupation of Assur by the Hittites in the third millennium B.C. (See ASSYRIA.) Whether Hatti (the modern Boghazkeui) was already at this time the capital of the Hittite power cannot yet be determined, but is altogether probable. It has been suggested that the advance of the Hittites from Asia Minor into Syria and Mesopotamia, where the State of Hani was founded by them on the middle Euphrates, was connected with the Hyksos invasion of Egypt, and that long before the eighteenth dynasty Palestine to its southern border was overrun with Hittites. This seems to be borne out by the traditions of the Hebrews. Statues of Marduk and Zarpanit were carried away to Hani probably in the days of Samsuditana; these were not brought back to Babylon until the time of Agum II Kakrime (c.1655-1625 B.C.). An oracle speaking of Marduk's deportation to the land of the Hittites probably refers to the same event. In 1470 and 1463 Thothmes III declared that he received tribute from the land of the greater Hatti. He seems to have taken the Hittite cities of Kadesh, Carchemish, and Nii. An Assyrian king sought the aid of Thothmes IV against the Hittite State of Marash, and in 1446 the Egyptian King fought against the Hittites. The Amarna letters (q.v.) show the growth of Hittite power in northern Syria. The Hittites were in alliance with the Kassites (q.v.) in Babylon, and Amorite chiefs like Abdasirta and Aziru (see AMORITES), while protesting fidelity to Egypt, were seeking the protection of the great King in Hatti. Subbiluliuma, the first of these monarchs known to us by name and possibly the founder of a new dynasty, sent a message to Amenhotep IV, probably to congratulate him on his accession to the throne (c.1389). The Mitannians (q.v.) in Mesopotamia and the Arzawi, probably in Armenia, who appear to have been Hittites in

the wider sense, maintained their independence, and the former were in alliance with Egypt. A complete list of the Hittite kings from about 1400 to 1250 has been obtained from the Babylonian Boghazkeui letters. Subbiluliuma was succeeded by Arandas, Mursil, Mutallu, Hattusil, Dudhalia, and Arnuanta. The greatest of these was Hattusil, the contemporary of Ramses II (1310-1244 B.C.). After the battle of Kadesh a treaty was concluded between them, and in 1290 an offensive and defensive alliance was established. Ramses II married Hattusil's daughter in 1277. Hattusil also made an alliance with Kadashman Turgu of Babylon and subsequently threatened to sever their relations if the son of this King was not given the crown. The good relations with Egypt seem to have continued after the death of Ramses II. But in the days of Ramses III the Hittites appear to have joined the confederacy of peoples that attacked Egypt, as the Egyptians declare that the Prince of the Hittites was captured in battle. Egypt was saved, but lost her influence in Syria; and the Hittite Empire came to its end through the invasion of new peoples into Asia Minor. For some time this Empire, which once, as the monuments show, held sway over the Troad, Lydia, and Cilicia, had evidently lost much of its power.

But strong Hittite city kingdoms still continued to exist for several centuries. Against these the Assyrians kept up a persistent warfare. Tiglath-pileser I made expeditions against the Hittites in Commagene (c.1120). Shalmaneser III (860-825 B.C.) fought against a confederacy of Syrian kings, led by Sangara of Carchemish, at the battle of Karkar in 854 B.C. The Chaldeans (q.v.) also waged wars against Hittite kingdoms. Menuas made a raid against Surisilis and Tarchigamas in the territory of the Hittite ruler Sadahalil. In another expedition he defeated the King of Gupis; and his son Argistis I likewise fought with Hittite rulers. Tiglath-pileser IV (745-728 B.C.) put a stop to the expansion of Chaldean power in this direction. Pisiris of Carchemish paid tribute to Tiglath-pileser IV in 739, but the city was afterward independent. It was Sargon II (722-705 B.C.) who finally conquered this important Hittite stronghold in 717 B.C.

The Hittites evidently belonged to the stock that inhabited Asia Minor before the invasion of Aryo-European nations. They are represented on the monuments with receding foreheads, large noses, marked cheek bones, and protruding upper jaws. Characteristic of their dress are the high peaked caps, the tunics reaching to the knees, and the shoes with ends turned up. From the type of personal names it may be inferred that the Hittite language belonged to the same family as some other early Asianic tongues. Unfortunately it has not yet been possible to decipher the native inscriptions. Of these a considerable number is now known. They have been found at Ibreez, Gaur Kalessi, Boghazkeui, Eyuk, Mount Sipylus, the Pass of Karabel, Mazaka, and elsewhere in Asia Minor, at Hamath, Aleppo, Carchemish, Nineveh, and Babylon. The hieroglyphic writing runs boustrophedon, as the ox plows—one line from right to left, the next from left to right. This is indicated by the direction of the faces. But the value of the signs has not yet been ascertained. A bilingual inscription on the so-called Tarkondemos boss, in Babylonian cuneiform and Hittite, is probably of

Mitannian origin, but has not furnished a sufficient clew. Among the many tablets discovered by Winckler at Boghazkeui in 1906 there were many in which the native language was written in cuneiform signs, while others were in Babylonian script and speech. The former may prove of great value to scholars; but they have not yet been published, and they are not so likely to throw light on the hieroglyphics as to give some knowledge of the language that will be available when the value of the signs shall have been correctly guessed. The attempts at decipherment by Wright, Conder, Sayce, Feiser, Jensen, Messerschmidt, and Gleye have not yet been crowned with success. In Syria the Hittites, like the Hebrews, probably adopted the language of Canaan, and later Aramaic. Among the Mitannians the Iranian element in the population seems to have affected to some extent their Hittite speech. As the system of hieroglyphics is entirely independent of the Cretan and the Egyptian as well as of the early Sumerian pictographs, so Hittite architecture and sculpture may have been more original creations than is generally supposed. The similarity to Sumerio-Akkadian motives on the one hand and Egyptian on the other is obvious and has naturally led to the assumption of borrowing. A strong influence exerted by the great rival civilizations at various times is also intrinsically probable. But only a more extensive knowledge of the earliest phase of Hittite history than we now possess can settle such questions as whether the Assyrian temples were built on Hittite models, and how far the sculpture of the Amoritical dynasty in Babylon reflects Hittite influence. On some of the finest specimens of Hittite art, see *EXUK*.

The chief sources of our knowledge of Hittite religion are the treaty between Hattusil and Ramses II, of which an Egyptian copy has long been known, and a résumé in Babylonian language and script was found by Winckler in 1906; a treaty between Hattusil and a Mitannian ruler, also discovered at Boghazkeui; allusions in other texts; and pictorial representations. There were gods of earth and heaven; and each river, mountain, land, and city had its male or female sutekh, its genius loci. Foremost among the gods were Hatti, Teshub, Tarchu, Chipa, and apparently Sandan and Ma. Hatti is represented at Yazyly Kaya in such a manner as to leave no doubt that he is the same god as the Phrygian Attys; and it is not improbable that the two names are identical. Teshub was worshiped by a number of peoples who may have been connected in some way with the Hittites. Tarchu has been thought to be identical with Terah, represented as the father of Abraham. Chipa occurs in Mitannian names like those of the princesses Tadu Chipa and Gilu Chipa, and of the Governor of Jerusalem, Arta Chipa. Sandan seems to have been especially connected with Cilicia, and Ma was the great mother goddess. In the Mitannian treaty Babylonian gods are mentioned, but also Iranian, such as Varuna, Mithra, and the Nasatyas. Survivals of the ancient Hittite religions may be found in Strabo's description of Cappadocia (XII, ii, 3, 6, 7) and possibly in Lucian's *De Dea Syria*, as the worship at Hierapolis-Mabug is likely to have been a continuation of that carried on at Carchemish (q.v.) until the destruction of this city.

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The Empire of the Hittites (London, 1884); Lantshere, *Hittites et Amorites* (Brussels, 1884); Sayce, *The Hittites: The Story of a Forgotten Empire* (London, 1888; 3d ed., ib., 1903); Conder, *Heth and Moab* (ib., 1889); Vigouroux, *Mélanges bibliques* (2d ed., Paris, 1889); Lantshere, *De la race et de la langue des Hittites* (ib., 1891); Jensen, *Hittiter und Armenier* (Strassburg, 1898); Messerschmidt, *Bemerkungen zu den hethitischen Inschriften* (Berlin, 1898); Luschan, Humann, Koldewey, *Ausgrabungen in Sendschirli* (ib., 1898-1911); Messerschmidt, *Corpus Inscriptionum Hettitarum* (ib., 1900 et seq.); W. Max Müller, in *Mitteilungen der vorderasiatischen Gesellschaft* (ib., 1902); Jensen, in *Zeitschrift der deutschen morgenländischen Gesellschaft* (Leipzig, 1904); Winckler, "Die im Sommer 1906 in Kleinasien ausgeführten Ausgrabungen," in *Orientalistische Literaturzeitung* (ib., 1906); Breasted, *Ancient Records of Egypt* (Chicago, 1906-07); Winckler, in *Mitteilungen der deutschen Orient Gesellschaft* (Berlin, 1907); Garstang, *The Land of the Hittites* (London, 1910); Olmstead, Charles, and Wrench, *Travels and Studies in the Near East. I: Hittite Inscriptions* (Ithaca, 1911); *Catholic Encyclopedia* (New York, 1913); Winckler, *Nach Boghazköi* (Leipzig, 1913); id., *Vorderasien im zweiten Jahrtausend* (ib., 1913); Hastings, *Encyclopædia of Religion and Ethics* (New York, 1914); Luckenbill, in *American Journal of Theology*, January, 1914 (Chicago); R. C. Thompson, *New Decipherment of the Hittite Hieroglyphics* (Oxford, 1914). See CARCHEMISH; CUNEIFORM INSCRIPTIONS.

HITTORF, hit'torf, JOHANN WILHELM (1824-). A German physicist, born at Bonn. In 1852 he became professor of chemistry and physics at Münster, where he remained in active service for half a century. Hittorf's earliest important researches were in electrolysis, and he was able to extend Faraday's work, his method of determining the mobility of ions being of the greatest importance to physical chemistry. In addition to his work in electrolysis he made elaborate investigations of the various phenomena attending the passage of electricity through gases. In 1862, with Plücker, he discovered that different spectra could be obtained from the same substances under different conditions of temperature. Later (1869), in studying the passage of electricity through tubes containing a rarefied gas, he observed that by increasing the exhaustion of the tube the dark space between the negative pole and the negative glow became wider, and that when the discharge from the cathode struck against the glass considerable fluorescence was produced. Hittorf also ascertained that these rays could be deflected by a magnet and anticipated Crookes, who in 1878 published his famous researches with the vacuum or Crookes tubes and named the rays thus produced radiant matter. He investigated the allotropic occurrence of selenium and phosphorus, and in the case of the latter substance he was successful in producing a crystallized form, black in color and with a metallic lustre. He was a foreign associate of the Berlin Royal Academy of Sciences. Hittorf's many valuable papers on physics and chemistry are to be found for the most part in Poggendorff's and Wiedemann's *Annalen der Physik* (Leipzig, current). This paper "On the Migration of Ions during Electrolysis" is contained in *The Fundamental Laws of Electrolytic Conduction* (New York, 1899), translated

from Poggendorff's *Annalen* and reprinted in German in *Ostwald's Klassiker*, No. 21 (Leipzig, 1891).

HITTORFF, è'torf', JACQUES IGNACE (1793-1867). A French architect, born in Cologne. He went to Paris in 1810, studied architecture under Ch. Percier (q.v.), and between 1819 and 1825 traveled extensively in England and Germany and in Sicily, where he studied the Greek ruins with particular reference to their polychromy. On his return he was appointed architect to the King, and with the assistance of Lepère built in Paris the fine Neo-Greek church of St. Vincent de Paul, applying to it the results of his researches in Greek polychromy. The exterior color decorations and paintings, however, failed to resist the climate and were removed a few years later. He was the chief designer of the embellishments for the Place de la Concorde, including its two fine fountains, and for the Champs Elysées and other avenues and squares. In 1864 he was made general inspector of the Conseil des Bâtiments. He published *Architecture antique de la Sicile* (1826-30), *Architecture moderne de la Sicile* (1826-35), *Architecture polychrome chez les Grecs* (1851)—all of which are still highly valued.

HITZIG, hits'ik, EDUARD (1838-1907). A German alienist, grandson of the biographer and criminologist Julius Eduard Hitzig. He was born in Berlin, studied medicine there and in Würzburg, and in 1875 became professor of psychiatry at Zurich. Four years afterward he became professor in Halle, where he established an independent clinic for nervous and mental disorders, the first in Prussia. Failing eyesight compelled him to give up his professorship in 1903. He wrote: *Physiologische und klinische Untersuchungen über das Gehirn* (1904), the result of long research on cerebral physiology and pathology, and especially on localization of the various functions; *Ueber traumatische Tabes* (1894); *Der Querulantenwahnsinn* (1895).

HITZIG, FERDINAND (1807-75). A German biblical scholar. He was born June 23, 1807, at Hainingen, Baden, and educated at Heidelberg, Halle, and Göttingen. In 1833 he was called to Zurich as professor of theology, with a special view to the exegesis of the Old Testament; but his lectures embraced also the New Testament and the languages of the East. In 1861 Hitzig returned to Heidelberg as professor. The first work which established his fame was his *Der Prophet Jesaja übersetzt und ausgelegt* (1833). Besides a translation of the Psalms, with a commentary (1835-36), he furnished for the *Exegetisches Handbuch zum alten Testament* the commentaries on the minor prophets (1838), on Jeremiah (1841), Ezekiel (1847), Ecclesiastes (1847), Daniel (1850), the Song of Solomon (1855), and Proverbs (1858), with a translation of all the prophetic books as a supplement (1854). He also published works on the New Testament and various archaeological subjects, and *Geschichte des Volkes Israel* (1869-70). His work is important in the progress of modern biblical scholarship. He died at Heidelberg, Jan. 22, 1875. Consult T. K. Cheyne, *Founders of Old Testament Criticism* (London, 1893), and, for his biography, H. Steiner (Zurich, 1882).

HITZIG, JULIUS EDUARD (1780-1849). A German criminal jurist and biographer. He was born in Berlin, studied law at Halle and Erlangen, and from 1799 to 1835 was connected more or less closely with the criminal courts of

Warsaw and Berlin. To this period belong the *Zeitschrift für die preussische Kriminalrechtspflege* (1823) and *Annalen für deutsche und ausländische Kriminalrechtspflege* (1828), both founded by him. At Warsaw he had been intimate with the poets Mnioch and Werner, and in Berlin he was even more prominent in literary circles as founder of the *Mittwochsgesellschaft*, a literary club. Hitzig was editor of the *Presszeitung* (1840-44) and author of biographies of Z. Werner (1823), of E. T. A. Hoffmann (1823; 3d ed., 1839), and, at his request, of Chamisso (1839-40). With Häring, in 1842, he began to publish *Der neue Putaval*; in 1826 he had brought out *Gelehrtes Berlin im Jahre 1825*.

HIVE BEE. The honeybee. See BEE.

HIVES. A name popularly given to the eruption known as urticaria, or nettle rash (qq.v.). The eruption appears as white rounded elevations or long wheals, which turn red later, especially after scratching or rubbing, for the itching and burning are intense. Eating lobsters or crabs has caused hives in some people. Certain drugs, such as the balsams, often cause it. After unloading the bowels, local treatment with dilute acids or bichloride of mercury will give relief. Alkalies and salicylates, taken internally, cut an attack short. In Great Britain the term is loosely applied to laryngitis and croup. See HIVE SIRUP.

HIVE SIRUP. *Syrupus Scillæ compositus*. The compound sirup of squills, a plant growing on the northern coast of the Mediterranean Sea. The bulb is the officinal portion. It is generally dried for use, but is sometimes imported packed in sand in a partially undried state. The sirup is prepared usually by taking of squill a moderately coarse powder, senega a moderately fine powder, tartrate of antimony and potassium, sugar, diluted alcohol, and water. The whole is carefully mixed according to formulæ laid down in the *Pharmacopœia*. In its action it is an emetic and combines the virtues of senega, squill, and tartar emetic, of the last of which it contains but one grain to the fluid ounce. It is also diaphoretic, expectorant, and in large doses cathartic. It was originally devised for the treatment of spasmodic croup, which is loosely known as hives in Great Britain, whence comes its popular name. Great care must be taken, in employing it, not to allow its sedative operation to proceed too far. In overdoses it has been known to produce a fatal inflammation of the stomach and bowels, since tartar emetic is highly poisonous.

HIVITES. One of the peoples mentioned in the lists of nations dispossessed by the Hebrews when they entered Palestine (Ex. iii. 8 et al.). In Gen. x. 17 they are placed among the sons of Canaan. They are especially connected with the Amorites and seem to have been a branch of this people. In Gen. xxxiv. 2 Shechem is a Hivite; in Gen. xlviii. 22 the city is inhabited by Amorites. Similarly the inhabitants of Gibeon are said to be Hivites in Josh. ix. 7; xi. 19, and Amorites in 2 Sam. xxi. 2. In Josh. xi. 3; Judg. iii. 3, Hivites appear in the Lebanon region. Consult Böhl, *Kanaanäer und Hebräer* (Leipzig, 1911).

HIZEN, hē'zēn'. One of the nine provinces of the island of Kyushu, Japan, famous in history and for its kaolin and the production of porcelain. It is rich in tea, tobacco, vegetable wax, and coal, but not in cereals, though in quality its rice is reckoned the best. Its chief towns are Saga and Nagasaki (q.v.). Arita and Imari,

both situated in this province, are famed for their ceramic ware. It was formerly divided among 10 daimyos (q.v.). It is now mostly within the Nagasaki-ken. Consult J. J. Rein, *Japan* (London, 1884), and for the ceramic industries of the province, Frank Brinkley, *Japan: Its History, Arts, and Literature* (8 vols., Boston, 1910).

HJÄRNE, yår'nē, HARALD GABRIEL (1848-). A Swedish historian, born at Klastorp, Vestergötland. He was educated at Upsala, where he obtained his doctor's degree and became lecturer (1872) and professor (1889). He published numerous articles on history and several large works. His studies on the relations between Russia and Sweden are of particular importance. He wrote: *Polens nordiska politik närmast före kongressen i Stettin 1570* (1884); *De äldsta svensk-ryska legationsakterna* (1884); *Från Moskva till Petersburg* (1888-89); *Sveriges statsskick under reformationstiden 1520-1611* (1893); *Gustaf Adolf, protestantismens förkampe* (1901; Ger. trans. in *Der Protestantismus am Ende des 19ten Jahrhunderts*, 1900-02); *Medeltidens statsskick* (1895); *Karl XII* (1902); *Blandade spörmål* (1903). In 1902-08 he was a member (Liberal) of the Lower House of Parliament. He also wrote *Ostanifrån; minnen och utkast* (1905); *Svenskt och frammande* (1908); *Ur det förgångna* (1912); *Stat och kyrka* (1912). Consult A. Grape, *Bidrag till en Hjärne-Biografi*, by 27 authors (Stockholm, 1908).

HJELT, hyëlt, EDVARD IMMANUEL (1855-). A Finnish chemist and educator, born in Wichtis, the son of a professor of medicine. He was educated at the University of Helsingfors, where he became lecturer in chemistry in 1880, was professor of chemistry in 1892-1907 and rector from 1899 to 1907, and then vice chancellor. In 1907-09 Hjelt was Vice President of the Senate of Finland. He was one of the revisers of Roscoe and Schorlemmer's *Treatise on Chemistry*, and wrote, besides many technical papers, biographical studies of great chemists, especially Berzelius. *Principles of General Organic Chemistry*, an English version from Hjelt's German book, appeared in 1890.

HJORT, hiört, JOHAN (1869-). A Norwegian zoölogist, oceanographer, and fisheries expert. He was born in Christiania and there studied medicine and zoölogy and became (1892) conservator of the zoötomical museum and (1893) government representative at the salt-water fisheries. After taking his doctor's degree at Munich, he was appointed, in 1906, fisheries director for Norway. The government furnished him with a staff of scientists and with the *S. S. Michael Sars*; in this vessel in 1910 he headed, with Sir John Murray, an expedition to Africa and America. Afterward he published, with Murray, *The Depths of the Ocean* (1912), and *Report on the Scientific Results of the Michael Sars North Atlantic Deep Sea Expedition, 1910* (1914). As member for Norway of the International Council for the Study of the Sea, he did much pioneer work. He wrote *Report on Norwegian Fishery and Marine Investigations* (vol. i, Christiania, 1900; vol. ii, Bergen, 1909); *Report on International Herring-Investigations in 1910* (Copenhagen, 1911), with E. Lea, and many other books and articles. In 1914 he visited Canada, upon the invitation of the government, to investigate the Canadian fish and fisheries.

HLADÍK, klád'ek, VÁCLAV (1868-). A Czech writer, born in Prague and educated at Českoslov and Prague. He repeatedly visited France and England and was strongly influenced by the French Naturalist school. Hladík occupies a prominent place in Czech journalism, having been editor of the *Národní Politický* and *Lumír*. Many of his writings were first published in periodicals and then collected in book form. They include: *Z lepší společnosti* (1892), sketches from the life of Prague; *Z pražského ouzduší* (1894); *O Současné Francii* (1909), a book of observations on French life; novels, *Trest* (1901), *Vasěň a sílka* (1902), *Valentinovy ženy*; and dramas, *Nový Život* (1896), *Závrat* (1902), etc. He is the chief representative of French literary ideals in modern Czech literature.

HOADLY, hōd'li, BENJAMIN (1676-1761). A Church of England prelate. He was born at Westerham, Kent, Nov. 14, 1676. He graduated B.A. at Cambridge, 1696, became preacher in London in 1701, Bishop of Bangor in 1715, of Hereford in 1721, of Salisbury in 1723, and of Winchester in 1734. He attracted attention by controversies with the Nonconformists and with the High Church party of the Church of England. His principles were developed in his *Essay on the Origin of Civil Government* (1709). The accession of George I in 1714 brought Hoadly's views into favor with the court, and he received advancement. In 1717 the so-called Bangorian Controversy arose. It began by Hoadly's publication of a pamphlet, and of a sermon on the text, "My kingdom is not of this world." He maintained that Christ had left behind Him no such authority as that claimed by churches, and that this was the best way of answering the pretensions of the Church of Rome. These views gave great offense both to High Church and Dissenters. He was attacked from all quarters, and the controversy raged for three years. He died at Chelsea, London, April 17, 1761. His works were published with a life by his son, John Hoadly (London, 1773). Consult Leslie Stephen, *History of English Thought in the Eighteenth Century* (3d ed., New York, 1902).

HOADLY, hōd'li, GEORGE (1828-1902). An American lawyer, and Governor of Ohio, born in New Haven, Conn. He was educated in the public schools of Cleveland, whither his father had moved in 1830. He graduated from Western Reserve College, then at Hudson, Ohio, in 1844, studied at Harvard Law School, was admitted to the bar in 1847, and two years later became a partner in the law firm of Chase and Bull at Cincinnati, in which Salmon P. Chase was the senior member. In 1851 he was chosen by the Legislature judge of the Superior Court of Cincinnati, in 1855 became city solicitor, and in 1859, upon the reorganization of the new Superior Court, was elected judge and was re-elected in 1864. He refused a seat on the supreme bench offered him by Governor Chase. Originally a Democrat, he took a prominent part in the "Barnburner" movement, was a War Democrat, and finally during the war allied himself with the Republican party. He resigned from the bench in 1866 to resume his law practice. In 1872 he was active in the Liberal Republican revolt, but dissatisfaction with the nomination of Greeley caused him to remain in the party. In 1876, however, he allied himself with the Democratic party on the tariff issue and was one of the counsel for Tilden before the Electoral Commission and argued the cases of

Florida and Oregon. In 1883 he was the party's candidate for Governor of Ohio, being elected over Joseph B. Foraker by 12,000. Two years later he was in turn defeated by Foraker for reelection to the same office. During 20 years of this period he was a professor in the Cincinnati Law School. From 1887 until his death he practiced law in New York City.

HOANG-HO, HUANG-HO, HWANG-HO, hwāng'hō', or YELLOW RIVER. Next to the Yang-tse-kiang, the largest river of China (Map: China. J 3). Its sources are two mountain torrents on the Odontala Plain, altitude 14,000 feet, south of the Buhhan Bota Mountains in Tibet, only a short distance north of the upper course of the Yang-tse-kiang. Its course is exceptionally tortuous. After flowing eastward to near the boundary of Tibet, it changes its direction first to the northwest and then to the northeast, in which latter direction it flows through the Chinese Province of Kansu. Leaving the Province of Kansu, it crosses the Great Wall into Mongolia. There it flows at first northeast and then east as far as the western boundary of the Chinese Province of Shansi, where it turns sharply to the south, and, passing the Great Wall again, flows between the provinces of Shensi and Shansi, forming their boundary line. At about lat. 35° N. it turns sharply east, which direction it maintains as far as the city of Kaifeng, in the Province of Honan. From that point it flows in a northeastern direction until it falls into the Gulf of Pechili about lat. 38° N. Its total length is probably over 2700 miles, and its basin is estimated at 400,000 square miles. The chief tributaries of the Hoang-ho are the Tao-ho from the south, the Wei-ho from the west, and the Tatum-ho from the north. The Hoang-ho is navigable for small vessels for a short distance from its mouth and in some parts of its middle course. The course of the river has changed repeatedly, and the present mouth was that of the Tatsin until 1853. Prior to that time the course of the river below Kaifeng was southeasterly, and its mouth in the Province of Kiangsu in about lat. 34° N. The sediment which is transported in large quantities by the Hoang-ho raises its bed, thereby causing inundations. These have been so frequent and so disastrous that the river has come to be known as "China's sorrow." Chinese history is filled with the vagaries of the Hoang-ho, disastrous changes in the channel having occurred in 1194, 1209, 1324, and 1853. In 1898, because of a destructive flood, silt and sand were deposited over an area of about 200 square miles, at a depth of from 2 to 10 feet, amounting in all to 16,000,000 cubic feet. The distress caused by this calamity was one of the causes of the Boxer Rebellion. It is estimated that the river will not keep to part of its present bed more than 15 years, as the flood level is now from 15 to 20 feet above the level of the plains below the city of Tungahsien. From time immemorial a vast system of dams and dikes has been maintained to keep the river in check. The river causes an annual expense and loss of about \$3,750,000 to the government and the provinces.

HOAR, hōr, EBENEZER ROCKWOOD (1816-95). An American jurist. He was born at Concord, Mass., the son of Samuel Hoar, graduated from Harvard College in 1835 and from Harvard Law School in 1839, and was admitted to the bar in 1840. He was a judge of the Court of Common Pleas from 1849 to 1855 and of the State

Supreme Court from 1859 to 1869. In 1869-70 he was Attorney-General of the United States in President Grant's cabinet. His zeal for civil-service reform aroused the hostility of "machine" politicians, and not only cost him his portfolio, but was responsible for the Senate's failure to confirm his nomination as associate justice of the Supreme Court. He was a member of the Joint High Commission that framed the Treaty of Washington in 1871 and was a Republican member of Congress in 1873-75. From 1878 to 1887 he was president of the board of overseers of Harvard University.

HOAR, GEORGE FRISBIE (1826-1904). An American legislator, born at Concord, Mass., Aug. 29, 1826. He graduated at Harvard in 1846, studied law in Harvard Law School, and in 1849 opened an office in Worcester. He was an ardent member of the Free Soil party and later of the Republican party, almost from the time of its organization, and in 1852 he was elected one of its representatives in the Massachusetts Legislature. Though his ambition at this time was for a legal rather than a political career, he was induced to accept other nominations, which resulted in his serving in both branches of the State Legislature and in the United States House of Representatives, of which he was a member from 1869 until 1877, when he was chosen Senator by his State. During his last year in the House he was a member of the Electoral Commission (q.v.), chosen in 1877, which decided that Hayes had been elected President over Tilden. He presided over the Republican National Convention of 1880, which nominated Garfield and thus ended the bitter contest between Grant and Blaine. He was always a consistent opponent of "imperialism" from the days when he aided Sumner in his opposition to the annexation of Santo Domingo; and though he supported President McKinley for reelection, he strongly opposed his policy in the Philippines, which he considered subversive of American ideals. During his service in the House Mr. Hoar was one of the managers of the Belknap impeachment trial, and after his election to the Senate he was chairman of the committees on the judiciary and on privileges and elections, and a member of the committees on engineering bills, civil service and retrenchment, library claims, Nicaragua claims, and rules, as well as chairman of the select committees on woman suffrage and relations with Canada. He served as regent of the Smithsonian Institution (1880), president of the American Antiquarian Society, president of the American Historical Association (1895), president of the board of trustees of Clark University (1900), and trustee of the Peabody Fund. He died in Worcester, Sept. 30, 1904. Consult his *Autobiography of Seventy Years* (2 vols., New York, 1903) and F. C. Lowell, "George Frisbie Hoar," in *Sons of the Puritans* (Boston, 1908).

HOAR, SAMUEL (1778-1856). An American lawyer and legislator. He was born at Lincoln, Mass., graduated at Harvard in 1802, was admitted to the bar in 1805, and soon became a prominent lawyer. He was a State Senator in 1825 and again in 1833 and was a Whig member of Congress from 1835 to 1837. In 1844 he was sent by the Massachusetts Legislature to South Carolina to test before the courts the constitutionality of certain laws of that State authorizing the imprisonment of free negroes coming into it. He was, however, not allowed to

plead, but was forcibly expelled from Charleston by the public authorities, the South Carolina Legislature by special act authorizing the expulsion.

HOARE, SIR RICHARD COLT (1758-1838). An English antiquary, born at Stourhead in Wiltshire. At 25 he married Lord Lyttelton's eldest daughter and after her death, two years later, traveled extensively over Europe. He wrote journals concerned with his tours in Ireland (1807) and in Italy (1819); a translation of Giraldus Cambrensis (1808); a topographical catalogue of the British Isles (1815); and, most important among his works, an *Ancient History of North and South Wiltshire* (1812-21), succeeded by an incomplete *History of Modern Wiltshire*, dealing with the southern section only (1822-44).

HOAR FROST. See FROST.

HOAR/HOUND. See HOREHOUND.

HOARSE/NESS. See THROAT, AFFECTIONS OF.

HOATZIN, hô-ăt'sîn (South American name), or HANNA. A bird (*Opisthocomus cristatus*) of Guiana and Brazil, possessing many conflicting characteristics of structure, so that its place in classification has been greatly in dispute. Some writers have regarded it as nearly related to the plantain eaters; others, to the curassows. Most recent writers have placed it with or very near the Gallinæ, but generally as a separate order, the Opisthocomiformes. It has the general shape of a curassow, but in size is much smaller, is olive color varied with white above and deep bay below, and has a long pendent crest of loose yellow feathers. The tail is long and



THE HOATZIN.

broadly tipped with yellow. It lives in bands in the forest, frequents the borders of streams, feeds upon leaves and fruits, rarely leaving the lower trees and bushes, flying weakly, and uttering a "sharp grating hiss" as a call note. It feeds largely on a species of arum, which at times gives its flesh and whole body a vile musky odor, so that it is known in British Guiana as "stink bird." On the Amazon it is called *cigano*, or "gypsy." Its nest is rudely built of sticks on some low bush, and the eggs, three or four in number, are whitish with reddish-brown blotches. The character and actions of the young are, however, the most remarkable thing about this extraordinary bird. They are hatched naked and possess at birth well-developed claws on both the index (forefinger) and pollex (thumb) digits of the fore limb. Soon after hatching the nestlings begin to crawl about by hooking these claws about twigs or any object accessible and

so use their wings precisely as feet, holding on also by the bill. This is an interesting reminder of the condition of the wing in the most ancient of birds (see *ARCHLEOPTERYX*), which used its anterior digits in much the same way. The young hoatzin, however, sheds its claws after a few days. Consult: Alfred Newton, *Dictionary*



YOUNG HOATZIN.

Showing handlike use of immature wings.

of Birds (New York, 1896); C. W. Beebe, "Ecology of the Hoatzin," *Zoologica*, i (ib., 1909); M. B. and C. W. Beebe, *Our Search for a Wilderness* (ib., 1910).

HOBAN, JAMES. An American architect, born in Ireland, c.1755. After some years' residence in Charleston, S. C., he went to Washington when that city was first laid out and worked there for the government for the greater part of his life (1792-1817). He is chiefly known as the architect of the White House, which he also rebuilt after its burning by the British in 1814. He was in charge also of the building of the Capitol under Thornton.

HOBART. The capital of Tasmania, situated on the river Derwent, 12 miles from its entrance into Storm Bay, on the south coast of the island (Map: Tasmania, D 3). Besides the government official buildings, Hobart has a college, a technical school, two cathedrals, hospitals, a free library, museum, and art gallery. Its naturally excellent harbor and quay with three patent slips accommodate ships of the largest size. It has considerable manufactures, a large export and import trade, railway communication with Launceston, and steamship communication with Sydney, Melbourne, New Zealand, and London. It is the seat of a United States consul and the see of Anglican and Roman Catholic bishops. With Mount Wellington as a picturesque background and with street railroads, fine parks and drives, Hobart is a favorite summer resort for Australians. The mean temperature for the year is 52.3°, being 42.1° in winter and 63.1° in summer. Pop., 1911, 27,526; with suburbs, 39,937. Hobart was founded in 1804 and became a city in 1857. In 1881 its name was changed from Hobart Town to the present form.

HOBART. A city and the county seat of

Kiowa Co., Okla., 55 miles west of Anadarko, on the Little and Big Elk rivers, and on the Chicago, Rock Island, and Pacific and the St. Louis and San Francisco railroads (Map: Oklahoma, C 3). It is situated in an agricultural region: carries on a trade in alfalfa, hay, grain, poultry, live stock, and dairy products; and has cottonseed-oil and alfalfa mills and a cotton compress. There is a Carnegie library. The water works are owned by the municipality. Hobart was opened by the government to white settlers in 1901. Pop., 1900, 3136; 1910, 3845.

HOBART, GARRET AUGUSTUS (1844-99). An American lawyer and politician, Vice President of the United States. He was born at Long Branch, N. J., graduated at Rutgers College in 1863, was admitted to the bar six years later, and practiced his profession with success at Paterson, N. J., where he made his home until death. He was city solicitor there in 1871, was a member of the State Assembly from 1873 to 1875, and of the State Senate from 1877 to 1883, presiding over both of those bodies. He was nominated to the United States Senate in 1884, but failed of election. He was four times successively delegate at large from New Jersey to the Republican National Convention and, having been nominated at St. Louis in 1896 for Vice President on the ticket with William McKinley, was elected. To a greater extent, perhaps, than any of his predecessors in the vice presidency, he made that office one of real influence and power. He was the intimate friend and counselor of President McKinley and exercised a strong influence on the conduct of public affairs. He defeated the move to give the Filipinos independence. He was interested in many banking and other business corporations, conducted many successful receiverships, and accumulated a large fortune. He died before the expiration of his term of office, on Nov. 21, 1899.

HOBART, JOHN HENRY (1775-1830). A Protestant Episcopal bishop of New York. He was born in Philadelphia, Pa., graduated at Princeton in 1793, and was tutor from 1795 to 1798, when he took orders. His first charges were in Philadelphia, New Brunswick, N. J., and Hempstead, L. I. He was appointed curate of Trinity Church, New York (1800); was ordained priest (1801); and after serving in various capacities was appointed (1816) rector of Trinity and Bishop of the diocese. In 1821 he was appointed professor of pastoral theology and oratory in the General Theological Seminary, which he helped to found. He spent the years 1824-25 in Europe, studying social, moral, and religious conditions. He died at Auburn, N. Y. His writings, which went through many editions, include: *Festivals and Fasts* (1804); *Clergyman's Companion* (1805); *Controversial Essays* (1806); *Apology for Apostolic Order* (1807); *The Christian's Manual* (1814); *A Comparison of the United States with England* (1826). He also edited D'Oyley and Mant's *Family Bible* (2 vols., 1818-20). Consult: W. Berrian, "Memoir," attached to the *Posthumous Works of Bishop Hobart* (New York, 1833); McVickar, *The Early and Professional Years of Bishop Hobart* (Oxford, 1838); *Correspondence of John Henry Hobart*, vols. i-v (New York, 1911-12).

HOBART, JOHN HENRY (1817-89). An American Protestant Episcopal clergyman and author, the youngest son of Bishop John Henry Hobart. He was born in New York City, graduated at Columbia College, and was ordained in

1841. After having a charge at Baltimore he was assistant in Trinity Church in New York City for 15 years and afterward became rector of Trinity Church, Fishkill, N. Y. He published: *Instruction and Encouragement for Lent* (1859); *Medievalism* (1877); *Church Reform in Mexico* (1877).

HOBART COLLEGE. An institution for higher education, founded at Geneva, N. Y., under Episcopal auspices. It was projected in 1812 and named after Bishop Hobart, through whose efforts it was organized. A provisional charter was secured in 1822 and a full charter in 1825, under the title of Geneva College. In 1852 the name was changed to Hobart Free College and in 1860 to Hobart College. The college offers academic courses leading to the degrees of Bachelor of Arts and of Science. William Smith College was opened in 1908 for the separate instruction of women. The work of the two colleges is carried on independently by a common faculty, upon whose recommendation the corporation of Hobart College grants to the students of both institutions the same degrees. In 1914 it had 72 students in William Smith College and 102 in Hobart, 23 instructors, 53,000 volumes in the library, total property valued at \$1,265,955, including grounds, buildings, and other equipment worth \$507,480, and an annual income of \$82,322. The president in 1914 was Lyman P. Powell.

HOBART-HAMPDEN, AUGUSTUS CHARLES (commonly known as **HOBART PASHA**, pá-shá') (1822-86). An English admiral in the Turkish service. He entered the British navy in 1835, distinguished himself in the Crimean War, and in 1863 was promoted to the rank of captain, but shortly after this he retired. During the American Civil War he was a blockade runner and had many narrow escapes. In 1867 Hobart entered the Turkish service as naval adviser to the Sultan. His first service was in suppressing the Cretan rebellion, for which he was promoted an admiral with the title of Pasha. He reorganized the Turkish fleet, which he commanded on the Black Sea against Russia, in the War of 1877-78, and in 1881 was appointed marshal of the Empire. Although his name was twice struck from the British navy list for operating against powers friendly to Great Britain in disregard of the Foreign Enlistment Act, he was finally restored in 1885 with the rank of vice admiral. His book, *Sketches of my Life* (1887), published posthumously, is a mixture of fact and fiction.

HOBBEA, hōb'bā-mā, MEINDEBT (1638-1709). One of the greatest Dutch landscape painters. He was born at Amsterdam in 1638, the date being verified by the statement in the record of his marriage there, Oct. 2, 1668, that he was 30 years old at that time. This marriage with the cook of Lambert Reynst, burgomaster of Amsterdam, put an end to his artistic career. For, through the influence of another maidservant in the burgomaster's household, he was appointed wine gauger to the city and ceased painting. He lived at Amsterdam and was a pupil and friend of Jacob van Ruysdael. They often worked together, painting the same scene side by side. As such well-known contemporaries as Berchen, Vanderveelde, and Lingelbach are said to have painted the figures in his landscapes, it seems likely that he was appreciated by the artists of his day. Nevertheless, he died at Amsterdam in poverty, Dec. 14, 1709.

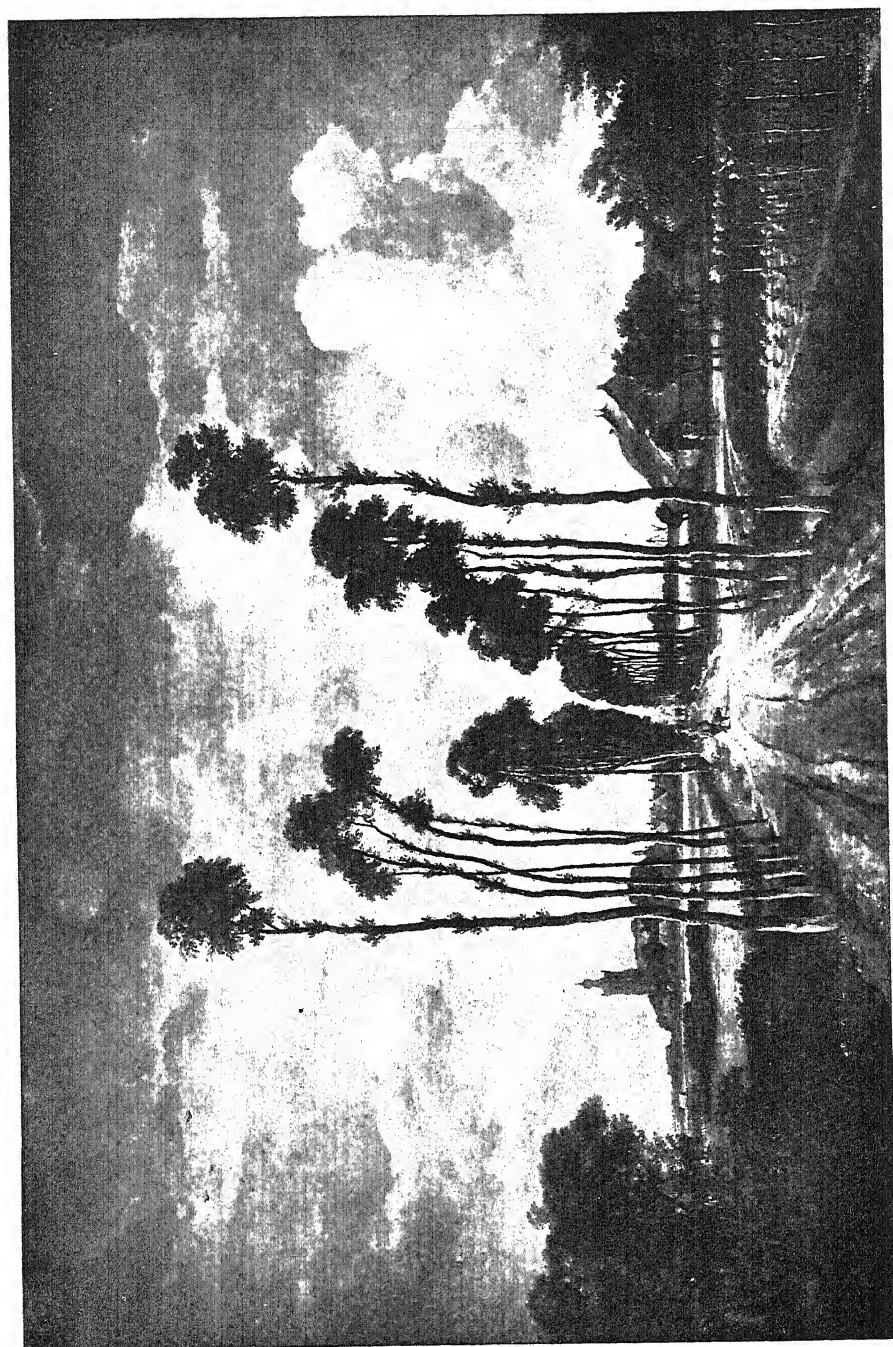
Hobbema and Ruysdael are the greatest land-

scape painters of the Dutch school; their art marks its consummation. Some of their works are difficult to distinguish; but Ruysdael is usually considered the greater because he is much more versatile. Hobbema, e.g., never painted rocky gorges, torrents, stormy autumn scenes, rough seas, coast scenes, panoramas, but preferred the gentler aspects of nature, such as quiet woodland scenes, pools of water with subtle sunlight effects, romantic water mills and streams. His pictures are rich in warm and golden tones, and his color, when it has not darkened, has a transparent quality, with brilliant effects reflected in sky and water. His technique is bold in touch, but careful in finish of detail, which occasionally becomes excessive. No one has better portrayed the magical effects of sunlight and atmosphere. It was not until the eighteenth century that his merit was appreciated. The English were the first to recognize it, and therefore far the greater number of his best works were in the private collections of England, from which they have been largely bought by American collectors. Hobbema also exercised great influence upon the English landscape painters of the latter eighteenth century, especially upon Old Crome. The rarity of his paintings has made them much sought after, and their high value has caused forgeries of signatures and dates.

Of all public collections the National Gallery, London, is richest in works of Hobbema, possessing nine, including the "Avenue, Middelharnis" and the "Ruins of Brederode Castle." Amsterdam has six, including the famous "Water Mill"; Glasgow and Brussels, each four; Paris, Dresden, and Frankfurt, each three; and Berlin two. Hobbema is especially well represented in the great American private collections. Thus, the Widener collection, Philadelphia, has four fine examples; the Frick collection, New York, three; the J. Pierpont Morgan collection three, two of which, the so-called Holford and Trevor landscapes, are on loan in the Metropolitan Museum, New York; and J. G. Johnson, Philadelphia, has four.

Bibliography. The best list of Hobbema's works is in Hofstede de Groot, *Catalogue of Dutch Painters*, vol. iv (London, 1912), with admirable brief biography. See also the scholarly treatise of Wilhelm Bode, *Great Masters of Dutch and Flemish Painting* (ib., 1909). Of a more popular character are F. E. Michel, *Hobbema et les paysagistes de son temps en Hollande* (Paris, 1890), and Frank Cundall, *The Landscape and Pastoral Painters of Holland* (London, 1891).

HOBBS, hōbz, JOHN OLIVER (PEARL RICHARDS CRAIGIE) (1867-1906). An English novelist, born in Boston, Mass. Her father removed to England while she was very young, and she was educated there by private tutors and later in Paris and at University College, London. She was married in 1887 to Reginald W. Craigie, but secured a divorce in 1895. She wrote the novels: *Some Emotions and a Moral* (1891); *A Study in Temptations* (1893); *The Gods, Some Mortals, and Lord Wickenham* (1895); *A Bundle of Life* (1894); *Robert Orange* (1900); *The Serious Wooing* (1901); *Love and the Soul Hunters* (1902); *The Vineyard* (1904); *Flute of Pan* (1905); *The Dream and the Business* (1906), posthumous; and the plays: *Journeys End in Lovers' Meeting* (1894), for Miss Ellen Terry; *The Ambassador* (1898); *A Repentance* (1899).



HOBBEWA
"THE AVENUE OF MIDDLEHARNIS," FROM THE PAINTING IN THE NATIONAL GALLERY, LONDON

A selection from her writings, *Life and Tomorrow* (New York, 1907), was made by T. Proctor. Her style is cynical, brilliant, and epigrammatic, especially in dialogue. Consult J. M. Richards, *Life of John Oliver Hobbes Told in her Correspondence with Numerous Friends* (ib., 1911).

HOBBS, THOMAS (1588-1679). An English philosopher and political theorist. He was born at Malmesbury on April 5, 1588, the son of a clergyman. At the age of 15 he went to Oxford and studied the usual course of Aristotelian logic and physics. At the age of 20, having taken his degree and quitted Oxford, he was recommended to Lord Cavendish, afterward Earl of Devonshire, as tutor to his eldest son. Thus began an intimate connection with that great family which lasted through his long life.

In 1610 he went abroad with his pupil and made the tour of France and Italy. After his return he still continued to live with the Earl of Devonshire's family, and his residence in London afforded him opportunities of becoming acquainted with Bacon, Ben Jonson, and the other distinguished men of the time. Meantime he was occupied with classical, political, and philosophical studies, and prepared for publication his first work, a translation of Thucydides, which came out in 1628. His interest in Thucydides was largely political. For many years he still derived his income from tutorial work, but gave his leisure to study. The political disturbances of the time made him desirous of political stability and order, which he believed could be obtained only by unquestioning recognition of the absolute power of the sovereign. This power, according to Hobbes, is neither original nor divine, but was delegated by the subjects in a compact which created the state and gave rise to all moral and political obligation. Primitive man did not live in any social or political organization. Every one was at first bent on securing his own selfish ends, but came to see that the warfare which inevitably resulted from the clash of unregulated interests was suicidal. A contract was made whereby this war of each against all—*bellum omnium contra omnes*—was brought to a close, a civil government established, and loyalty pledged to the sovereign power thus constituted. Whatever laws this power lays down are the measure of right and wrong. Thus, instead of recognizing "the divine right" of kings, Hobbes derived their sovereignty from the original contract; and although he vigorously maintained the supreme authority of the crown, the fact that this authority is of human origin logically involved the possibility of revoking it. So that, in spite of Hobbes's strong defense of royal sovereignty, his views were unwelcome to those in authority. These views were published in various works: *De Cive* (1642); *Humane Nature* (1650); *De Corpore Politico* (1650); *Leviathan, or the Matter, Form, and Power of a Commonwealth* (1651).

After the meeting of the Long Parliament in 1640 Hobbes had returned to Paris, from his dread of the civil troubles. In 1647 he was appointed mathematical tutor to the Prince of Wales, afterward Charles II; but the character of his writings, especially after the publication of the *Leviathan*, so offended the Royalist clergy, in common with all other sects, that Charles was induced to part with him, and he took alarm for his personal safety and abruptly fled in 1651 to Paris; but after a short stay there, knowing that

he had caused much irritation in France by his bitter attacks on the papacy, he returned to England, where he was allowed to live quietly. Very different was his position after the Restoration; for although Charles granted him a pension of £100 a year, the dislike to his views was so general that they were condemned by the House of Commons in 1666, and he was in danger of still severer measures. His connection with the Earl of Devonshire, with whom he lived in the latter part of his life, was no doubt a powerful protection to him. His old age was fruitful in additions to his writings and was marked by some sharp controversies. His last works were a translation of Homer and a history of the civil wars. He died on Dec. 4, 1679.

All his Latin works were collected and published by himself (Amsterdam, 1668) and by Molesworth (5 vols., London, 1839-45). His English works were edited by Molesworth (11 vols., including index, London, 1839-45). F. Tönnies edited and published *Behemoth, or the Long Parliament* (London, 1889). The Cambridge University Press publishes a convenient edition of the *Leviathan*. Woodbridge has edited a selection from Hobbes's writings (Minneapolis, 1903).

In philosophy and psychology Hobbes was a sensationalist and, at least at times, a materialist. All change for him is motion; hence sensuous perception is motion, and pleasure is also motion. Just why motion should appear in the form of consciousness is an inexplicable mystery. Sense impressions, in their combinations and transformations, give rise to memory and thought. This takes place according to definite laws. The order of succession of memory ideas is that of the original sense impressions, while the impressions originally in combination tend to reappear in the same combination; this fact he called the law of contiguity. Indeed, Hobbes is commonly regarded as the "father of associational psychology." Hobbes's ethics was hedonistic. It is man's desire for pleasure that made him in the first instance establish civil authority, but it is the supremacy of that authority which makes it binding now. Consult: Tönnies, "Anmerkungen über die Philosophie des Hobbes," four articles in *Vierteljahrsschrift für wissenschaftliche Philosophie* (Leipzig, 1879-81); Robertson, *Hobbes* (Edinburgh, 1886); Wille, *Der Phänomenalismus des Thomas Hobbes* (Kiel, 1888); Lewis, *Ueber den Individualismus bei Hobbes* (Halle, 1892); Lyon, *La philosophie de Hobbes* (Paris, 1893); F. J. Tönnies, *Hobbes Leben und Lehre* (Stuttgart, 1896); E. H. Sneath, *Ethics of Hobbes* (Boston, 1898); William Graham, *English Political Philosophy from Hobbes to Maine* (New York, 1900); Leslie Stephen, *Hobbes* (ib., 1904); A. E. Taylor, *Thomas Hobbes* (ib., 1909).

HOBBS, WILLIAM HERBERT (1864-). An American geologist. Born at Worcester, Mass., he graduated from Worcester Polytechnic Institute in 1883; and he studied also at Johns Hopkins University (Ph.D., 1888), and at the University of Heidelberg (1888-89). At the University of Wisconsin he was curator of the geological museum (1889-90), assistant professor of mineralogy and metallurgy (1890-99), and professor of mineralogy and petrology (1899-1906), and at the University of Michigan professor of geology and director of the geological laboratory after 1906. From 1886 to 1906 he served with the United States Geological Survey. His

publications include: *Earthquakes* (1907; Ger. trans., 1910); *Characteristics of Existing Glaciers* (1911); *Earth Features and their Meaning* (1912). In 1909 he became editor of the *Journal of Geology*.

HOB'BY (OF. *hobe*, from *hober*, to move, from Old Dutch *hobben*, to toss, *hoppen*, to hop, AS. *hoppian*, Ger. *hopfen*, to hop). A small European falcon (*Falco subbuteo*), formerly trained in falconry to fly at pigeons and partridges. The nearest North American species is the pigeon hawk.

HOB'HOUSE, ARTHUR, first BARON (1819-1904). An English judge, born at Hadspen, Somerset. He was early educated at Eton and graduated from Balliol College, Oxford, in 1840. In 1845 he was called to the bar at Lincoln's Inn, acquired a large chancery practice, became a queen's counsel in 1862, but retired from practice in 1866. In that year he accepted the post of charity commissioner. From 1872 to 1877 he was legal counsel on the staff of the Governor-General of India, and from 1881 to 1901 he served on the judicial committee of the Privy Council. Hobhouse was made a peer in 1885. Active in the work of the Municipal Reform League, he became one of the first aldermen under the newly created London County Council in 1888. He did much to promote desirable legal reforms. Some of his addresses on property were published under the title *The Dead Hand* (1880).

HOBHOUSE, JOHN CAM. See BROUGHTON, BARON.

HOBHOUSE, L(EONARD) T(RELAWNEY) (1864-). An English philosopher, son of the Archdeacon of Bodmin. Educated at Oxford, he became fellow of Merton in 1887 and assistant tutor of Corpus Christi in 1890 and fellow in 1894. He was on the editorial staff of the *Manchester Guardian* in 1897-1902, and, after being secretary of the Free Trade Union, on the staff of the *Tribune* in 1906-07. In 1907 he became professor of sociology in London University. His earlier theory of mechanical causation he gradually gave up for a theistic and teleological one. He wrote: *The Labor Movement* (1893; 3d ed., 1912); *The Theory of Knowledge* (1896); *Mind in Evolution* (1901); *Democracy and Reaction* (1904); an elaborate work on *Morals in Evolution* (1906); a sketch of *Liberalism* (1911); *Social Evolution and Political Theory* (1911), Columbia University lectures on the Julius Beer foundation; *Development and Purpose* (1913). He edited the University of London *Monographs on Sociology*.

HOB'KIRK'S HILL, BATTLE OF. A battle fought at Hobkirk's Hill, about 2 miles north of Camden, S. C., on April 25, 1781, during the American Revolution, between an American force of about 950, under General Greene, and an English and Loyalist force about equal in number, under Lord Rawdon. The latter, leaving his strong position at Camden, fell upon the Americans unprepared, and after some stubborn fighting Greene's favorite regiment, the First Maryland, was stricken with panic. The victory gave no strategic advantage to Rawdon, who on May 10 evacuated Camden and retreated towards Charleston. The loss of the Americans in killed, wounded, and missing was 271; that of the English and Tories, 258. This engagement is also known as the second battle of Camden. Consult Carrington, *Battles of the American Revolution* (6th ed., New York, 1904), and Edward Mc-

Crady, *The History of South Carolina in the Revolution* (2 vols., ib., 1901-02).

HOBOKEN. A city in Hudson Co., N. J., on the Hudson River, opposite New York, with which it is connected by ferry and tube, and adjoining Jersey City. It is the terminus of the Hamburg-America, North German Lloyd, Holland-American, and Scandinavian-American steamship lines, and of the Delaware, Lackawanna, and Western, the Lehigh Valley, and the West Shore railroads (Map: New York City, Borough of Manhattan, B 17). It lies at the base of the Palisades, the principal streets running north and south, parallel to the river. In the eastern section rises a hill. The site of Stevens Institute of Technology (q.v.) is fronted by Hudson Park. In the latter is a soldiers' monument; and in Church Square Park are situated the public library and a firemen's monument. St. Mary's Hospital is a noteworthy structure. Hoboken is a great shipping place for coal. The most important manufactures comprise foundry and machine-shop products, marine engines, technical instruments, cork products, motor fire engines, castings, elevators, inks, metal tubes, chemicals, waterproofed fabrics, lead pencils, leather goods, silk, wall paper, and caskets. The government is administered by a mayor, elected every two years, who appoints school, health, fire, and library commissioners, and, with the consent of the council, assessors and police commissioners, of which board he is the president. The council is unicameral and elects the city clerk and assistants and inspectors. The municipal income and expenditures amounted in 1912 to \$4,240,000 and \$3,930,000 respectively, the main items of expense being \$129,000 for the fire department, \$153,000 for the police department, \$225,000 for operation of the water works, and \$428,000 for schools. Pop., 1900, 59,364; 1910, 70,324; 1914 (U. S. est.), 74,994.

The land on which Hoboken stands was part of the patroonship granted to Michael Pauw in 1630 and was then called Hobocan Hacklingh (the land of the tobacco pipe), in allusion to the fact that Indians carved pipes from a kind of stone found here. A house was built about 1640 by Arendt Teunisson Van Putten, and a straggling settlement grew up; but the present city really dates from 1804, when John Stevens, "the founder of Hoboken," bought the land and laid out a town. During the first quarter of the nineteenth century the Elysian Fields in Hoboken were the favorite pleasure resort for New Yorkers and became noted as the meeting place of Federalist politicians. Hoboken was incorporated as a town in 1849, its population then being about 2000, and in 1855, with a population of about 6700, it was chartered as a city. In 1900 a fire at the wharves of the North German Lloyd Steamship Company caused the loss of about 300 lives and destroyed property, including three steamers, valued at \$5,000,000. Hoboken is associated with the early development of steam navigation and steam railroads in this country. The modern type of ferry slip, built of piling, was invented by Colonel Stevens and first used here, as was the steam-propelled ferryboat, invented by the same man in 1811. Consult Winfield, *History of the County of Hudson* (New York, 1874).

HOBRECHT. See OBRECHT.

HOB'SON, JOHN ATKINSON (1858-). An English economist, born at Derby. He was

educated at Lincoln College, Oxford, from 1880 to 1887 was classical master in schools at Faversham (Kent) and Exeter, and from 1887 to 1897 was lecturer in English literature and economics for the University Extension Delegation and the London Society for the Extension of University Teaching. From the time of the appearance of his *Problems of Poverty* (1891, No. 2 in the "Social Questions of To-Day Series") he became known as one of the more prominent British economists of the recent school and a very effective writer. His other publications include: *The Physiology of Industry: Being an Exposure of Certain Fallacies in Existing Theories of Economics* (1889), with A. F. Mummery; *The Evolution of Modern Capitalism* (1894); *Coöperative Labour upon the Land, and Other Papers* (1895); *The Problem of the Unemployed: An Enquiry and an Economic Policy* (1896); *John Ruskin, Social Reformer* (1898); *The War in South Africa: Its Causes and Effects* (1900); *The Economics of Distribution* (1900); *Capitalism and Imperialism in South Africa* (1900); *The Psychology of Jingoism* (1901); *The Social Problem; Life and Work* (1901); *Imperialism* (1902); *International Trade* (1904); *Canada To-Day* (1906); *The Industrial System* (1909); *The Science of Wealth* (1911); *The Economic Interpretation of Investment* (1911); *Gold, Prices, and Wages* (1913).

HOBSON, JOSEPH (1834-). A Canadian civil engineer. He was born in the township of Guelph, Ontario, and was educated at the local schools. He studied surveying and engineering and entered the service of the Grand Trunk Railway as an assistant engineer on construction west of Toronto. He afterward became assistant engineer on various railway lines in Nova Scotia, Ontario, and Michigan; was resident engineer of the International Bridge, Buffalo (1870-73); was appointed chief engineer of the Great Western Railway (1875); and from 1896 until 1907, when he retired, he was chief engineer of the Grand Trunk Railway system. In 1890-91 he built the St. Clair Tunnel, Ontario, and in 1897 had entire charge of the reconstruction of the Victoria Jubilee Bridge, Montreal.

HOBSON, RICHMOND PEARSON (1870-). An American naval constructor, born in Greensboro, Ala. He entered the Southern University in 1882, but three years afterward accepted an appointment to the United States Naval Academy, where he graduated in 1889, and then took a postgraduate course at the Ecole Nationale Supérieure des Mines and the Ecole d'Application du Génie Maritime in Paris. He served on various naval stations and at the New York and the Newport News navy yards, and in 1897 he was ordered to Annapolis to organize a postgraduate course for those officers who intended to enter the construction corps. During the war with Spain he was present at the bombardment of Matanzas and took part in the expedition against San Juan de Puerto Rico; but his great achievement was the sinking of the collier *Merrimac* in the entrance to Santiago harbor before daylight, on June 3, 1898, in order to "bottle up" Cervera's fleet. He did not succeed in accomplishing the desired result, as the gear of the stern anchors was shot away and the current swung the ship parallel to the channel instead of across it; but the daring of the exploit made popular heroes of all concerned

in it. After the war he raised and refitted several of the Spanish warships which had been sunk in Cuban and Philippine waters. He resigned from the navy in 1903 and entered political life. In 1906 he was elected to Congress, and until 1915 he represented a district of his native State in that body. Among his publications are *The Disappearing Gun Afloat* and *The Sinking of the Merrimac*.

HOC'CLEVE, or OCCLEVE, THOMAS (?1370-?1450). An English poet. Concerning his life very little is known. For 24 years he was clerk in the Privy Seal Office, London. His principal work, *De Regimine Principum* (Concerning the Duties of Kings), mainly a digest of a Latin treatise under the same title by Ægidius Colonna, consists of 5488 lines in Chaucer's seven-line stanza. In the prologue, which comprises about a third of the work, Hoccleve mentions some incidents of his life. He says he was poor and his pension not paid and laments the death of Chaucer, who is called the "foure of eloquence." The rest of the long poem is devoted mainly to moral reflections on the manners of the time. On the margin of one of the manuscripts Hoccleve drew in colors the well-known portrait of Chaucer, his "maister dere." Hoccleve also wrote several other poems, among which is the beautiful orison to the Virgin, beginning "Mother of God and Virgin undefouled." This last poem has been attributed to Chaucer. Consult *Works*, ed. F. J. Furnivall for the Early English Text Society (London, 1892-97).

HOC'CO (native name in Guiana). A native name applied by Buffon to curassows in general, but apparently applicable and now restricted especially to the Mexican species (*Crax alector*), also called royal pheasant by the Mexicans. Consult Sumichrast, "Native Birds . . . of Vera Cruz," in *Memoirs of the Boston Society of Natural History*, vol. i, part iv (Boston, 1869). See CURASSOW.

HOCHBERG, hōc'bērk, BOLKO, COUNT VON (1843-). A German patron of music and dramatic composer, whose earlier music appeared under the pseudonym "J. H. Franz." He was born at Castle Fürstenstein in Silesia, studied law at Bonn and Berlin, and soon gave up the diplomatic service to devote himself to music. Hochberg founded in 1870 the Silesian musical festivals, to the success of which he greatly contributed. From 1886 to 1903 he was general superintendent of the Court Theatre of Berlin. Besides symphonies, songs, and string quartets, he composed *Claudine von Villabella* (1864) and *Die Falkensteiner* (1876), entirely rewritten and produced as *Der Wärrwolf* (1881).

HOCHÉ, ôsh, LAZARÉ (1768-97). A general of the French Revolution. He was born June 25, 1768, at Montreuil, near Versailles. In 1784 he entered the National Guard, but joined the regular army at Paris in 1792 as a sergeant of grenadiers. Owing to his military experience and soldierly qualities, he rapidly obtained promotion. In 1793, after distinguishing himself under Le Veneur, he was made adjutant general of the Army of the North. Some hasty words, caused by the arrest of his chief, Le Veneur, brought about Hoche's arrest; but he was acquitted by the revolutionary tribunal at Douai and restored to his command and aided Souham in the defense of Dunkirk. Having succeeded in repulsing the Duke of York, Hoche was made a general of division and given the command of the French forces on the Moselle and in spite

of the numerical superiority of the enemy succeeded in driving the Austrians out of Alsace after defeating them at Weissenburg (Dec. 26, 1793). His important services were requited, however, by suspicion and arrest, and had it not been for the downfall of Robespierre Hoche would probably have perished on the guillotine. He was next intrusted with the task of suppressing the Royalist revolt in La Vendée and at the head of an army of 100,000 men succeeded in pacifying the country in less than a year (1794-95). His great victory in this campaign was over the *émigrés* at Quiberon. In December, 1796, he commanded the army destined for the invasion of Ireland; but adverse conditions of wind and weather scattered his ships and made the expedition a failure, though a part of the fleet succeeded in reaching the Irish coast. Hoche was then made commander of the Army of the Sambre and Meuse and in the spring of 1797 won several victories over the Austrians. The preliminaries of Leoben put an end to his activity, and on Sept. 19, 1797, he died very suddenly at his camp at Wetzlar, though not by poison, as some have supposed. There are numerous biographies of Hoche, the best being: Claude Desprez, *Lazare Hoche, d'après sa correspondance* (Paris, 1858); H. de Font-Réaulx, *Le général Hoche* (ib., 1890); A. Griffiths, *French Revolutionary Generals* (London, 1891); Albert Sorel, *Bonaparte et Hoche* (Paris, 1896).

HOCHKIRCH, hōc'kērk, or **HOCHKIRCHEN**. A village in the District of Bautzen in Saxony. It was the scene of a battle between the Austrians and Prussians (Oct. 14, 1758) during the Seven Years' War. Frederick the Great of Prussia, with an army 30,000 to 40,000 strong, having taken up an almost untenable position at Hochkirch, was surprised in the nighttime, under cover of a thick fog, by Marshal Daun, with 65,000 Austrians, and compelled to retire to the heights of Drehsa. Here he was again attacked by the Duke of Arenberg and after a conflict of five hours' duration again retired. He lost 9000 men killed and wounded and 100 guns. He himself and almost all his generals were wounded. The Austrians lost 6000 men. On May 21, 1813, a battle took place here between the French and the allies, which was won by the former. See BAUTZEN.

HÖCHST, hēkst. A town in the Prussian Province of Hesse-Nassau, at the confluence of the Nidda and the Main, 7½ miles northwest of Frankfurt. Höchst has one of the largest paint and dye factories in Germany, employing about 4300 men. There are also large porcelain works, established in 1740, and manufactures of iron and brass ware, lighting fixtures, crackers, biscuits, tobacco, gas and water mains, machinery, oilcloth, gelatin, and furniture. Höchst was made a city in 1400. Pop., 1890, 8455; 1900, 14,121; 1910, 17,240.

HÖCHSTÄDT, hēk'shtēt. See BLENHEIM.

HOCHSTETTER, hōc'shtēt-ēr, FERDINAND VON (1829-84). An Austrian geologist, born at Esslingen, Württemberg, and educated at Tübingen, where he received the traveling scholarship in geology. He was a member of the *Novara* expedition (1857-59) and made a special study of the geology of New Zealand and the gold fields of Australia, the results of which were published in the account of the expedition and in a small work on New Zealand. After his return to Europe he was appointed a

professor at the Vienna Imperial Polytechnic Institute and afterward director of the Imperial Museum of Natural History (1876). He wrote an authoritative work on the geology of Turkey and the Ural region and published, together with Hann and Pokodny, the *Allgemeine Erdkunde*.

HOCK, HOUGH, hōk (AS. *hōh*, OHG. *hahsa*, Ger. *Hechse*, hock; ultimately connected with Lat. *cowa*, thigh, Skt. *kakṣa*, armpit). The joint between the stifle and the fetlock in a horse's hind leg. *Hook joint*, the hinge formed by tibia and astragalus.

HOCK/DAY (from AS. *heah*, high + *dæg*, day). The second Tuesday after Easter; formerly a popular festival in England observed as late as the seventeenth century. Hockday and Michaelmas (q.v.) were the rent days in rural England. Hocktide or Hockdays included Hock Tuesday and the day before. The origin of the festival is uncertain.

HÖCKERT, hēk'ert, JOHAN FREDRIK (1826-66). A Swedish genre and historical painter, born at Jönköping. He studied at the Stockholm Academy under Boklund, with whom he was in Munich (1846-49); visited Lapland with the botanist Andersson (1849); went to Paris (1851) and allied himself with Max Hess; traveled through Holland, Belgium, and England (1857) and, in 1861, through Spain, Italy, and north Africa. He was a member and a professor of the Stockholm Academy. Among his works are: "Christina Ordering the Execution of Monaldeschi" (1853); "The Rescue of Gustavus Vasa" (1858); the uncompleted canvas "Burning of the Palace in Stockholm, 1697"; "Service in a Lapland Chapel," at Lille; "Interior of a Hut in Lapland" (1858), in the Stockholm Museum; and the "Rättvik Maiden," at Göteborg. He has been called the Swedish Delacroix and ranks high as a colorist.

HOCK/ET (OF. *hoquet*, *hooquet*, *houquet*, hicough; so called from the broken effect). A musical trick much used by composers during the twelfth and thirteenth centuries. In a composition for two or three voices one voice suddenly, and at irregular intervals, interrupted the other voices. The passages where such interruptions occurred were called hocket.

HOCKEY (also *hawkey*, *hookey*, apparently from *hook*, in allusion to the hooked club with which the game is played. Murray's *New English Dictionary* (1901) cites OF. *hoquet*, shepherd's staff, crook, but adds that the "connecting links are wanting"). An outdoor game played on a ground 100 yards long and not less than 55 nor more than 60 yards wide, by two teams of 11 players each, armed with sticks curved at the end, with which each team attempts to drive a ball into the goal of the other. The game is probably as old as any involving a ball. In the Copenhagen National Museum is an altar pot, made about the year 1300, on which are two figures of men with curved sticks, apparently playing some such game, and there appears in a Galway statute of 1527 a prohibition of "the horlinge of the litill balle with hockie stickes or staves," while Cowper in 1785 mentioned a game called "hockey" played by the boys at Olney. Not until 1876 was any code of rules formulated for the game. Ten years later the English Hockey Association was organized, and since then the popularity of the game in the British Isles has steadily increased, while it has also been taken up in the various British colonies and in Bel-

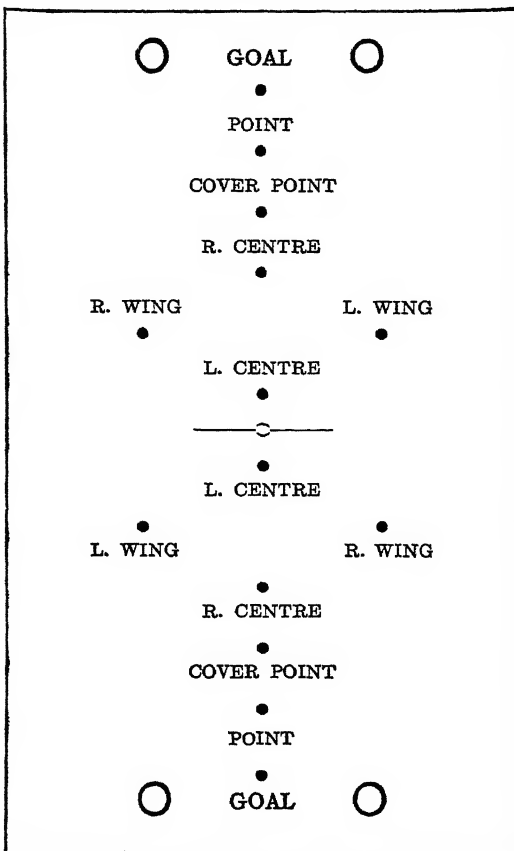
gium, Denmark, Holland, France, and Germany, with the result that in 1907 the International Hockey Board was formed to provide for international contests.

A hockey team usually consists of five forwards, three half backs, two backs, and a goal keeper, though this formation is not compulsory. The game is divided into two halves of 35 minutes each (unless another time is agreed upon), the teams changing sides at the end of each half. In the centre of each goal line is the goal, consisting of two posts, 4 yards apart, joined at their tops by a horizontal crossbar 7 feet from the ground. Nets are attached to the posts, crossbars, and ground beyond the goals. In front of each goal is drawn a white line 4 yards long, parallel to and 15 yards from the goal line. This line is continued each way to meet the goal line by quarter circles which have the goal posts as centres. The space within these lines is called the striking circle. The ball is either a leather cricket ball painted white or is made of white leather. The stick may have a flat surface on its left-hand side only, must not have any sharp edges, must pass through a two-inch ring, and must not weigh more than 28 ounces. The play is begun by two opposing players "bullying" the ball in the centre of the ground; i.e., each player must strike the ground on his own side of the ball and his opponent's stick over the ball three times, after which either player may strike the ball. A goal is counted when the ball has passed entirely over the goal line under the bar, the ball while within the striking circle having been hit or glanced off the stick of an attacker. While in play, the ball may be caught, but must immediately be dropped to the ground; or it may be stopped, but it may not be picked up or in any other way moved except with the stick.

Ice Hockey. The old winter game of hockey, or shinny, is the basis of the modern game of ice hockey, but the modern game is more scientific than its English and Scottish predecessors. The old game was played on more or less frozen ground, and the players cared more about action than rules, and in the beginning no restrictions existed as to the number on each side, the shape or proportion of the sticks, the size or material of the ball, the size of the playing space, or even the manner of making a goal. The organization of this crude game into the present scientific, exciting, and dangerous contest, played entirely on skates, began in 1881 with the McGill College and Victoria Hockey teams in Montreal, Canada, where the game, as a purely winter sport, has something of the popularity of baseball in the United States. The first series of challenge games between Canadian teams was played in 1884, and in 1887 the Amateur Hockey Association of Canada was formed. The game was soon taken up by players in the United States, where the American Amateur Hockey League was formed in 1896. This organization adopted a regular constitution and a set of rules which govern most amateur contests. Practically all of the larger northern universities and colleges in the United States now have hockey teams, and an intercollegiate schedule is played off each season. These American college and the athletic club teams have developed many fine players; but the most skillful teams are those of Canada, and notably the Wanderers, of Montreal, the Quebecs, and the Ottawas. Since 1895 the most im-

portant Canadian trophy for hockey has been the Stanley Cup.

The rules of the American Amateur Hockey League provide that the game shall be played on a rink at least 112 feet long by 58 feet wide,



POSITIONS OF A HOCKEY TEAM.

by teams of not more than seven players each, whose positions are shown on the accompanying diagram. The sticks must not be more than 3 inches wide at any point, nor more than 13 inches long on the blade, and must be made entirely of wood, though tape binding is permitted. Players must not wear skates that are pointed or sharpened so as to be unnecessarily dangerous. For the ball, used in English hockey, is substituted a puck, which must be made of vulcanized rubber 1 inch thick; it must be 3 inches in diameter and must weigh not less than $7\frac{1}{8}$ nor more than $7\frac{3}{4}$ ounces. The game is divided into two halves of 20 minutes each, with an intermission of 10 minutes. A goal is scored when the puck passes between the goal posts. The goals are placed midway on each goal line; each consists of a goal net supported by two upright posts, 4 feet high, placed 6 feet apart, and at least 10 and not more than 15 feet from the edge of the ice. Consult Arthur Farrel, *How to Play Hockey* (Spalding's Athletic Library, New York, issued annually).

HOCK'ING. A river in Ohio, rising near Lancaster, Fairfield Co. (Map: Ohio, F 7). It flows southeast and empties into the Ohio River below Parkersburg, W. Va., after a course of 80 miles. Boat navigation is possible for about 70

miles and can be continued through the Hocking Canal, which passes along its shore.

HOCKING, JOSEPH (1860–). An English Wesleyan clergyman and novelist, brother of Silas K. Hocking, born at St. Stephen's, Cornwall. He graduated in 1881 from Crescent Park College, Victoria Park, where he was a prize-man, and also from Owens College, Manchester, in the same year. The year 1878 he spent as a land surveyor. He entered the ministry of the Wesleyan Methodist church in 1884 and in 1887 traveled extensively in Egypt, Palestine, Syria, Greece, and Turkey. He wrote more than 20 novels, beginning with *Jabez Easterbrook* (1891), some of the later of which deal with the conflict between Protestants and Roman Catholics—*The Sword of the Lord* (1909) is a story of the time of Luther.

HOCKING, SILAS KITTO (1850–). An English novelist, brother of Joseph Hocking, born at St. Stephen's, Cornwall. He entered the Wesleyan ministry, but resigned in 1896. His novels, which have a strong flavor of Methodism, were immensely popular, and their total sales ran over 1,000,000 copies. The critics pass these stories by, but admiring readers are legion. Among Hocking's uncounted novels may be mentioned: *Alec Green* (1878); *Sea Waif* (1882); *Real Grit* (1887); *God's Outcast* (1898), which has as its appealing hero a Methodist minister who married the wrong woman; *Israel Pendray* (1899), notable for its account of Wesley's preaching in Cornwall; *Mistress Nancy Molesworth* (1899), a story of eighteenth-century Cornwall; *Who Shall Judge?* (1910); *The Third Man* (1911); *Quenchless Fire* (1912); *Woman's Love* (1913); *In Self-Defense* (1914).

HOCKTIDE. See HOCKDAY.

HODEIDA, hō-dē'ī-dā. An important fortified seaport of Yemen, Arabia, situated on the coast of the Red Sea, about 100 miles north of Mocha (Map: Turkey in Asia, E 8). Its roadstead is somewhat obstructed by coral reefs, but it is nevertheless the chief centre of the Arabian coffee trade. Hodeida is the chief landing place for Mecca pilgrims from Africa. It has steamer connection with Aden, Suez, and Nassawa. Pop. (est.), 40,000.

HODELL, hō'dēl, FRANS OSCAR LEONARD (1840–90). A Swedish dramatist and poet, born at Stockholm. He was in early life an actor, then editor (1870) and proprietor of the *Söndagsnisse*, a humorous journal. He was the author and adapter of a large number of plays, such as the popular *Andersson, Petersson, och Lundström* (1866), and wrote also some verses and ballads, under the title *Visor och kupletter* (1873).

HODGE. 1. In *Gammer Gurton's Needle*, the husband of Gammer Gurton, whose breeches she was mending when the needle was lost. 2. The conventional class name for the English farmer or countryman.

HODGE, ARCHIBALD ALEXANDER (1823–86). An American Presbyterian theologian, the son of Charles Hodge. He was born at Princeton, N. J., graduated at Princeton in 1841, and was an assistant professor there from 1844 to 1846. In 1847 he graduated at the Princeton Theological Seminary and for three years was missionary at Allahabad, India, under the auspices of the American Presbyterian Missionary Society. After 1851 he held pastorates in Maryland, Virginia, and Pennsylvania, and in 1864 was called to a church in Allegheny, Pa., where

until 1877 he was also professor of didactic theology in the Western Theological Seminary. In 1878 he succeeded to the chair of didactic, exegetical, and polemic theology at Princeton, made vacant by the death of his father, to whom he had been appointed assistant professor the year before. He was a trustee of Princeton College and edited for a period the *Presbyterian Review*. He published several theological and other works, including: *Outlines of Theology* (1860; new ed., 1879); *The Atonement* (1868; new ed., 1886); *Life of Charles Hodge, Professor in the Theological Seminary, Princeton* (1880); *Manual of Forms, Conformed to the Doctrine and Discipline of the Presbyterian Church* (1883); *Popular Lectures on Theological Themes* (1887).

HODGE, CHARLES (1797–1878). An American Presbyterian theologian and historian, of Scotch-Irish descent. He was born in Philadelphia, graduated at Princeton in 1815, and at the theological seminary there in 1819, became assistant professor in his alma mater the following year, and with the exception of an interval of two years (1826–27) in Europe, studying at the universities of Paris, Halle, and Berlin, was connected with its faculty until his death. From 1822 he was professor of Oriental and biblical literature and from 1840 professor of didactic and exegetical theology, polemic theology being added in 1852. In 1872 the semicentennial anniversary of his professional life was commemorated at Princeton by the foundation of the Charles Hodge professorship, with an endowment of \$50,000. He was also the recipient of a gift of \$15,000. In 1846 he was moderator of the Presbyterian General Assembly and in 1858 was one of the revisers of the *Book of Discipline*. He was editor of the *Biblical Repertory*, which he founded in 1825, expanding the title four years later to the *Biblical Repertory and Princeton Review*. He retired from the editorship in 1871. His chief work, *Systematic Theology* (3 vols., 1871–72), is still considered one of the best interpretations of the Calvinistic doctrine. Other important works are a *Constitutional History of the Presbyterian Church in the United States* (2 vols., 1840–41), *The Way of Life* (1842), and *What is Darwinism?* (1874). He also published several commentaries. Consult *The Semi-Centennial Commemoration of the Professorship of Charles Hodge, D.D., LL.D., September 24, 1872* (Philadelphia, 1872) and A. A. Hodge, *Life of Charles Hodge, Professor in the Theological Seminary, Princeton* (New York, 1880).

HODGE, FREDERICK WEBB (1864–). An American ethnologist, long connected with the Smithsonian Institution. He was born at Plymouth, England, but came to America in 1871 and was educated in the public schools and in Columbian (now George Washington) University. In 1886 he was made secretary of the Hemenway archaeological expedition and in this position he traveled through Arizona and New Mexico until 1889, when he joined the Bureau of Ethnology of the Smithsonian Institution. His work here was the preparation of a *Cyclopedia of Indian Tribes*. In 1895, 1897, and 1899 he explored New Mexico and Arizona again, and on the second trip he scaled the Enchanted Mesa. In 1901 he became executive officer of the Smithsonian Institution. In 1910 he became ethnologist in charge of the Bureau of Ethnology, the *Handbook* of which (2 parts, 1907–10) he prepared. His more important

works are: *List of Publications of the Bureau of Ethnology*, written while he was librarian of that department (1894); *The First Discovered City of Cibola* (1895); a pamphlet on *Coronado's Route from Culiacan to Quivira* (1899); and his contributions to the *American Anthropologist*, of which he was managing editor from 1899 to 1910 and again after 1912. He also edited Curtis's *North American Indian; Narratives of Cabeza de Vaca and Coronado* (1907); *Handbook of Indians of Canada* (1913).

HODGE, HUGH LENOX (1796-1873). An American physician, born in Philadelphia, the brother of Charles Hodge. He graduated at Princeton in 1814, studied medicine, and began to practice in 1820. During the cholera epidemic of 1838 he successfully employed a system of treatment largely based on observations made during a two years' residence in India. In 1835 he was appointed professor of obstetrics in the University of Pennsylvania and retained his connection there until 1863. He was the author of *Diseases Peculiar to Women* (1859), *Principles and Practice of Obstetrics* (1864), and *Feticide* (1869).

HODGES, HÖJ'ÉZ, GEORGE (1856-). An American Protestant Episcopal theologian, born at Rome, N. Y., and educated at Hamilton College (A.B., 1877; A.M., 1882; LL.D., 1912). He was assistant in 1881-89 and rector in 1889-94 of Calvary Church, Pittsburgh, Pa., and thereafter was dean of the Episcopal Theological School at Cambridge, Mass. He is author of *The Episcopal Church* (1889); *Christianity between Sundays* (1892; 1914); *The Heresy of Cain* (1894; 1914); *The Battles of Peace* (1897; 1914); *William Penn* (1900); *The Human Nature of the Saints* (1904); *Three Hundred Years of the Episcopal Church in America* (1906); *The Administration of an Institutional Church* (1906); *The Year of Grace* (2 vols., 1906; 2d ed., 1914); *Apprenticeship of Washington* (1909); *The Training of Children in Religion* (1910; 1912); *Everyman's Religion* (1911; 1913); *Saints and Heroes* (2 vols., 1911-12); *Glassbook of Old Testament History* (1913).

HODGES, JOHN SEBASTIAN BACH (1830-1915). An American Protestant Episcopal clergyman, born in Bristol, England (son of Dr. Edward H. Hodges, organist of Trinity Church, New York City). He came to this country in 1845 and graduated at Columbia College in 1850 and at the General Theological Seminary, New York, in 1854. After ministerial service in the West and at Newark, N. J. (1860-70), he was rector of St. Paul's Church, Baltimore, from 1870 until his retirement in 1906. His musical compositions, which include chants, anthems, and hymn tunes, are widely known. His chief work is the *Book of Common Praise* (1886), compiled as a companion to the *Book of Common Prayer*.

HODGES, NATHANIEL DANA CARLILE (1852-). An American librarian, born at Salem, Mass. He graduated from Harvard University in 1874 and studied at the University of Heidelberg (1874-75). He taught physics at Cambridge, Mass. (1876-77) and at Harvard (1877-81), was assistant editor and editor of *Science* (1883-94), and served as assistant at the Astor Library, New York (1895-97), and at the Harvard University Library (1897-1900). In 1900 he became librarian of the Public Library of Cincinnati. He was president of the American Library Association in 1909-10.

HODGINS, HÖJ'INZ, JOHN GEORGE (1821-1912). A Canadian educator and author. He was born in Dublin, Ireland, but went to Canada with his parents in 1833. He was educated at Upper Canada College, at Victoria University, Cobourg, and, in law, at Toronto University. After holding various posts, he was deputy superintendent of education (1855-76) under Egerton Ryerson (q.v.), after whose retirement in 1876 he was deputy minister of education for the province until 1890. He was then made librarian and historiographer of the Education Department, and in 1904-12 was historiographer solely. An early investigation made by him of the Irish educational system resulted in improvements to the schools of Upper Canada, and in 1871 his report upon technical schools in the United States led in part to the establishment of the School of Practical Science, now a department of Toronto University. In 1885 he was honorary secretary to the International Congress of Educators at the New Orleans Exposition. For 30 years editor of the *Upper Canada Journal of Education*, he was one of the pioneers in Canadian schoolbook literature, especially in the department of geography, and throughout his career was an important figure in the educational activities of Ontario. In 1861 he was elected a fellow of the Royal Geographical Society; in 1879 he received the French decoration of the Palm Leaf; during the governorship of the Marquis of Lansdowne he was awarded the Confederation medal for services as a public officer and man of letters; and in 1903 he was given the decoration of the Imperial Service Order. He published: *A Geography and History of British America* (1857); *History of Canada* (1860); *School Law Lectures* (1878); *Legislation and History of Separate Schools in Upper Canada* (1897); *Popular Education in England* (1899); *School Room Decoration* (1900); *The Establishment of Schools and Colleges in Ontario, 1791-1910* (1910); *Documentary History of Education in Upper Canada* (28 vols., 1910-13), a work of permanent historical value.

HODGKIN, HÖJ'KIN, THOMAS (1831-1913). An English banker and historian. He was born at Tottenham, studied at the Friends' Grove House School there, and graduated at University College, London. He studied law, but poor health forbade him to practice; so he busied himself at banking and built up a large firm, Hodgkin, Barnett, & Co. In 1874 he gave himself up to literary work. He wrote: *Italy and her Invaders* (8 vols., 1880-99); *Letters of Cassiodorus* (1886); *The Dynasty of Theodosius* (1889); *Theodoric the Goth* (1891); *George Fox* (1896); *Life of Charles the Great* (1897); *Ernst Curtius* (1905); *Political History of England from the Earliest Times to the Norman Conquest* (1906); *The Trial of our Faith* (1911).

HODGKIN'S DISEASE (LYMPHADENOMA, PSEUDOLEUCÆMIA). A form of anæmia, attended by swelling of the lymphatic glands and spleen. The cervical glands are the first to enlarge, followed by the axillary, and then the inguinal lymph nodes. The exciting cause is not known, but the disease has been attributed to decayed teeth and nasal suppuration, chronic tonsillar infection, and other inflammations; but the etiology is as obscure now as it was when Hodgkin described the affection in 1832. In the early stages there is only a slight

anæmia. Later there is a great increase in the number of white blood cells (leucocytosis), the polymorphonuclear leucocytes alone being increased. The disease is most common between the ages of 15 and 35. Recovery is rare, death taking place usually in the third year of the disease. Excision of the cervical glands is advised in the beginning, when only these are involved. Later, operation is of no benefit. Iron, arsenic, cod-liver oil, phosphorus, and bone marrow are given with great benefit in many cases. The X-ray is credited with some cures. See ANÆMIA.

HODGKINSON, hōj'kin-son, EATON (1789–1861). An English civil engineer, born at Anderton, Cheshire. After a rather desultory schooling in which he displayed an aptitude for mathematics, he undertook a course of scientific investigation that soon won him distinction. His first important work was on strains and the strength of materials, on which subject he read a paper before the Literary and Philosophical Society of Manchester in 1822. In 1828 and in 1830, respectively, he gave to the same society the results of his researches on the forms of the catenary in suspension bridges and on the strength and best forms of iron beams. In 1847 he was appointed professor of the mechanical principles of engineering at University College, London. From 1847 to 1849 he was one of the royal commissioners engaged in inquiring into the application of iron in railroad structures. From 1848 to 1850 he was president of the Manchester Literary and Philosophical Society. He was a member of the Geological Society, of the Royal Irish Academy, and an honorary member of the Institute of Civil Engineers. He made investigations as to the temperature of the earth in deep mines which were of especial interest. His experiments on the strength of materials, and especially his determination of the "neutral line" in the section of fracture, with the resultant designs for beams, mark an important step in the science of modern engineering. He published *Researches on the Strength and Other Properties of Cast Iron* (1846). Consult the "Life of Eaton Hodgkinson," in the *Memoirs of the Manchester Literary and Philosophical Society*, No. ii (3d series, Manchester, 1862).

HODGSON, BRIAN HOUGHTON (1800–94). An English Orientalist and zoologist, born at Lower Beeches and educated at Haileybury. He entered the English civil service at Calcutta in 1818 and remained in it until 1843, when he was removed, apparently without cause, by Lord Ellenborough. Hodgson then lived for a few months in Europe, but soon returned to India and lived practically alone at Darjeeling (1845–58), where he made important additions to the classified fauna of India. Besides his zoological specimens he made valuable collections of Indian manuscripts and of ethnological material. These collections he distributed generously among European museums, giving especially to the British Museum. His written studies were on the ancient texts of India, especially the literature of Buddhism, on the modern vernacular and the subject of "national education," on the ethnology of the hill tribes, on Hindu law and practice, especially in Nepal, and on zoology. Among his works, besides scores of articles in reviews and governmental bulletins, may be mentioned: *Literature and Religion of the Buddhists of the North* (1841); *Letters on Na-*

tional Education for the People of India (last ed., 1847); *Aborigines of India* (1847); *Essays on the Language, Literature, and Religion of Nepal and Tibet* (1874); *Miscellaneous Essays Relating to Indian Subjects* (1880). Consult W. W. Hunter, *Life of Brian Houghton Hodgson* (London, 1896).

HODGSON, JOHN EVAN (1831–95). An English historical and genre painter. He was born in London, spent his youth in Russia, and entered the schools of the Royal Academy in 1855. He became A.R.A. in 1873, R.A. in 1879, and in 1879 librarian and professor of painting. At first he painted domestic and historical pictures, but in 1868 a visit to Tunis and Tangiers interested him in Arab life, to which he chiefly confined himself thereafter. Among his earlier pictures are: "Arrest of a Poacher," "Canvassing for a Vote," "First Sight of the Armada," "Queen Elizabeth at Purfleet." His later works include: "An Arab Story-Teller," "A Tunisian Birdseller," "An Arab Patriarch," "Army Reorganization in Morocco." All of his pictures, Oriental as well as English, possess charm, sentiment, and often humor, but are tame in conception and sober in color. He wrote *The Royal Academy and its Members, 1768–1830* (1905), with F. A. Eaton.

HODGSON, SHADWORTH HOLLOWAY (1832–1912). An English metaphysician, born in Boston, Lincolnshire, and educated at Rugby and Oxford. In 1880 he became president of the Aristotelian Society for the systematic study of philosophy, was frequently reelected, and in his addresses to the society and its proceedings gave much of his best work. Besides these, various contributions to *Mind*, and the miscellaneous works, *The Principles of Reform in Suffrage* (1866) and *Outcast Essays and Verse Translations* (1881), mention should be made of the preliminary studies entitled *Time and Space* (1865); *The Theory of Practice* (1870); *The Philosophy of Reflection* (1878); and of the summing up of his metaphysic, *The Metaphysic of Experience* (1898), the most forcible and valuable of his works, in which he claims that "metaphysic like pure mathematic is fontal and preinductive," and as a phenomenist takes a strong stand against transcendental realities.

HÓDMEZŐ - VÁSÁRHELY, hód'mě-zě-vá'shär'hély'. A city in the County of Csongrád, Hungary, on Hód (Moon) Lake, 16 miles northeast of Szegedin (Map: Austria-Hungary, G 3). Among its principal buildings are the town hall, hospitals, and a Gymnasium. The city owns 383 square miles of the surrounding territory and so has risen into prominence as an agricultural and trading centre. In the neighborhood are raised cattle and the cultivation of the vine and tobacco is extensively engaged in. The industrial establishments include breweries and an oil factory. The town is protected from overflow of the Tisza by a large dike. Pop., 1900, 60,883; 1910, 62,394, mostly Magyars.

HODOGRAPH (from Gk. ὁδός, *hodos*, way + γράφειν, *graphein*, to write). A velocity curve, representing the acceleration of a given motion. In Fig. 1, V_1, V_2, V_3, \dots represent the velocities of a point P , which moves along the curve C , at the various positions P_1, P_2, P_3, \dots . In Fig. 2, OV_1, OV_2, OV_3, \dots are drawn parallel and equal to V_1, V_2, V_3, \dots . The curve H , formed by joining the points V_1, V_2, V_3, \dots , is called the hodograph of the motion of P . If V describes the curve H , while P describes the curve C , then the velocity

of V at any point, laid off on the tangent of the curve H at that point, represents the acceleration of the point P both in magnitude and

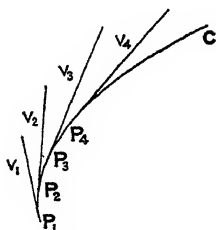


FIG. 1.

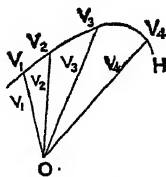


FIG. 2.

direction. Thus, the velocity of the hodograph is the acceleration of the original motion.

HOD'SON, WILLIAM STEPHEN RAIKES (1821-58). An English soldier, born at Maisemore Court, near Gloucester, and educated at Rugby and at Trinity College, Cambridge (B.A., 1844). In 1845 he joined the army in India and participated in the Sikh War. Two years afterward he had command of native troops and distinguished himself during the mutiny as leader of the irregular cavalry called Hodson's Horse. In 1849, when the Punjab was annexed to the British Empire, he was stationed at Umritsur as assistant commissioner; but he resigned in 1852 to reënter active duty in the army. He was killed at Lucknow. Consult: *Hodson of Hodson's Horse, or Twelve Years of a Soldier's Life in India*, being extracts from Hodson's letters, edited by his brother G. H. Hodson (London, 1889); L. J. Trotter, *Life of Hodson of Hodson's Horse* (Edinburgh, 1910).

HODY, HUMPHREY (1659-1707). A Church of England divine. He was born at Odombe, Somersetshire, Jan. 1, 1659, graduated B.A. at Oxford in 1679, became fellow of Wadham College there in 1685, and in 1697-98 regius professor of Greek. He died near Bath, Jan. 20, 1707. He participated on the government side in the controversy over the bishops and their followers who refused to accept William and Mary as their legal sovereigns—the so-called Nonjurors; and also in that about the rights and powers of convocation, contributing the valuable *History of English Councils and Convocations and of the Clergy's Sitting in Parliament* (London, 1701). But his lasting reputation rests upon his work on the Hebrew text, the Septuagint, and Vulgate version of the Bible, *De Bibliorum Textibus Originalibus* (1705). His life, written largely by himself, appears in Jebb's edition of his *De Græcis Illustribus* (London, 1742).

HOE (from OF. *houe*, hoe, from OHG. *houwa*, Ger. *Haue*, hoe, from OHG. *howan*, Ger. *hauen*, AS. *hæwan*, Eng. *hew*). An agricultural implement, used for stirring the soil, drawing up earth to plants, thinning plants in drills, clearing the ground of weeds, etc. There are two classes of hoes—*draw hoes* and *thrust hoes*. In the former the blade is almost at right angles to the handle; in the latter, almost in the same plane with it. The thrust hoe, or Dutch hoe, is chiefly used for killing weeds and for stirring ground to a very slight depth. The draw hoe is much used in gardening and is in some countries very extensively used in place of the spade in agriculture. Hoes intended for tilling the ground, instead of the plow and spade, and for

grubbing, are much larger and heavier than those ordinarily used, are raised much higher, and brought down to the ground with greater force, somewhat like the pickaxe. Hoes for stirring very stiff soils are sometimes made with prongs instead of a blade.

HOE. The name of a family prominently identified with the manufacture and improvement of the printing press in America.—**ROBERT** (1784-1833) was born in Leicestershire, England. He was indentured to a joiner, in 1802 emigrated to the United States, worked for a time as a master carpenter, and subsequently was an associate of his brothers-in-law, Peter and Matthew Smith, in the business of carpentry and in the manufacture of a hand printing press invented by the former. In 1823 he became sole proprietor of the business, retiring in 1832. A skillful mechanic, he constructed and introduced the original Hoe press and was, it is thought, the earliest American machinist to utilize steam as a motive power in his plant.—**RICHARD MARCH** (1812-86), son of the foregoing. He began the practical study of printing-press manufacture in 1827 and soon became a partner of the Hoe firm. He devised numerous ingenious improvements in the presses and also produced a fine quality of steel saw. In 1841 he, in connection with his brothers, Peter Smith Hoe and Robert Hoe, took over the entire direction of the business. The first form of rotary press, called the type revolving printing press and widely known as Hoe's lightning press, was brought out by him in 1846 and forthwith was very extensively adopted for newspaper work. (See PRINTING.) Afterward he invented the web perfecting press, which superseded his former invention and prints upon both sides of the sheet and includes complicated apparatus for cutting and folding. (See PRINTING.) Constant improvements were made by him in the output of his works.—**ROBERT** (1839-1909), a son of Robert Hoe, 2d, succeeded to the headship of the firm, which continued its preëminence among printing-press makers. He was one of the organizers and first president of the Grolier Club, the well-known New York organization for the promotion of bookmaking as an art. He was an extensive collector of rare books and manuscripts as well as of silver, miniatures, and other art objects, his collections at the time of his death being valued at several million dollars. The catalogues of his library were unique and valuable from both a typographical and a bibliographical standpoint. He edited Maberly's *Print Collector* (1880), and was the author of *A Short History of the Printing Press* (New York, 1902) and *Bookbinding as a Fine Art* (Grolier Club, ib., 1886). Consult a brief and fragmentary biographical sketch by Gilliss in the *New York Genealogical and Biographical Record*, vol. xli (ib., 1910).

HOEBER, hō'bër, ARTHUR (1854-1915). An American landscape painter, born in New York City. He studied at the Art Students' League, New York, under Beckwith, and at the Ecole des Beaux-Arts, Paris, under Gérôme. In 1882 he exhibited at the Salon his "Sur la Grande Route" and in 1885 "Le Pain Quotidien." His paintings are to be found in most American exhibitions. He was art critic of the *New York Times* for three years, associate editor of the *Illustrated American* for one year, and later became art critic of the *New York Globe and Commercial Advertiser*. He also became known

as a lecturer on art. He was elected an Associate National Academician. He published *The Treasures of the Metropolitan Museum of Art* (1892) and *Painting in the Nineteenth Century in France, Belgium, Spain, and Italy*.

HOECKE, VAN DEN, vān den hū'k'e. A family of Flemish painters.—**JAN** (1611–51), a portrait and figure painter, was a pupil of his father, Caspar, and of Rubens. After studying also in Italy and executing commissions for the Emperor of Austria, he settled in 1647 in Antwerp, as court painter to the Archduke Leopold Wilhelm. With that prince's collection a number of his best works came into the possession of the Vienna Gallery; others are at Antwerp. His portraits resemble Van Dyck's rather than those of Rubens.—His brother **ROBRECHT** (1622–48), also a pupil of his father, was an architect as well as painter. As controller of the fortifications of Flanders, he painted many views of camps, battles, and cities, very detailed in execution and pleasing in color. His work also is well represented in the Vienna Gallery.

HOEFNAGEL, hōō'f'nā'gēl, JORIS (1545–1610). A Flemish illuminator and miniature painter, born at Antwerp. He was a pupil of Jan Bol at Mechlin and for some time was at the court of Bavaria. He then went to Prague and finally to Vienna. His masterpiece is in the museum there, a Roman missal done for the Archduke Ferdinand. It is elaborately ornamented, and he worked on it for eight years (1582–90). Another fine work of Hoefnagel's is a miniature view of Seville (1573), in the Brussels Museum.—His son **JAKOB** (1575–1629), a miniature painter and engraver, was court painter to the Emperor Rudolph II.

HÖEGH-GULDBERG, hēg-guld'bērg, OVE. See **GULDBERG**, OVE **HÖEGH**.

HOENSBROECH, hōns'brōg, PAUL, COUNT (1852–). A German theologian, born at Castle Haag in the Province of Gelderland. When nine years old, he entered the Jesuit school in Feldkirch. Afterward he attended the Jesuit college at Stonyhurst, England, where he studied philosophy for a year, and then he studied law at the universities of Bonn, Würzburg, and Göttingen. In 1876 he set out on his travels through France, Portugal, Spain, northern Africa, and Italy, and in 1878 entered the Society of Jesus. In 1903 he was a candidate for the Reichstag, but was defeated by his Social-Democratic opponent. While a member of the Society, he wrote *Der Kirchenstaat in seiner dogmatischen und historischen Bedeutung* (1899) and *Christ und Widerchrist: Ein Beitrag zur Verteidigung der Gottheit Christi und zur Charakteristik des Unglaubens in der protestantischen Theologie* (1892). In 1893 he left the Jesuit Order and published a work entitled *Mein Austritt aus dem Jesuitenorden* (1893), which led to a bitter attack upon him by the Ultramontane press. Two years later he joined the Evangelical church. His later writings include: *Moderner Jesuitismus* (1893); *Der konfessionelle Friede und die deutschen Jesuiten der Gegenwart* (1896); *Das Papsttum in seiner sozialkulturellen Wirksamkeit* (vol. i, 3d ed., 1901; vol. ii, 1902).

HOERNES, hēr'nēs, MORITZ (1852–). An Austrian ethnologist, born in Vienna and educated at the universities of Vienna and Berlin. He saw military service in the occupation of Bosnia in 1878 and in 1879–80 led a scientific expedition through Bosnia and Herzegovina. He

was for several years custodian of the Vienna Natural History Museum. Hoernes edited the *Wissenschaftliche Mitteilungen aus Bosmen und der Herzegowina* (1893 et seq.) and wrote: *Altertumer der Herzegowina und Bosniens* (1881); *Dinarische Wanderungen* (1888); *Urgeschichte des Menschen* (1891); *Urgeschichte der Menschheit* (1895; 2d ed., 1897); *Natur- und Urgeschichte des Menschen* (1909); *Kultur der Urzeit* (1912).

HOERNLE, hēr'n'le, AUGUSTUS RUDOLF FREDERIC (1841–). An English Orientalist and prominent authority on Indian antiquities and languages. He was born at Agra, British India; was educated at Esslingen, Stuttgart, Basel, London, and Tübingen; became a missionary of the English church at Mirat in 1865; and taught for four years at the Jay Narain's College in Benares. He entered the governmental educational service in 1881, after several years as principal of the mission college at Calcutta, and until 1899, when he retired and returned to England, was principal of the Calcutta Madrasah. He edited: *Chanda's Grammar of the Ancient Prākṛit* (1880), *The Pruthirāj Rāsan* (1886), *The Bover Manuscript . . . with English Translation* (1893), and *The Uvāsagadaśo with Abhayadeva's Commentary* (1888–90); translated *The Sūtrutsamhitā, or the Hindu System of Medicine* (1897 et seq.); and wrote, among other linguistic works of considerable importance, *A Comparative Grammar of the Gaudian Languages* (1880) and, with Grierson, the incomplete *Comparative Dictionary of the Bihārī Language* (1885 et seq.). In 1907 he published the first part of *Studies in the Medicine of Ancient India*, dealing with osteology. With H. Stark he wrote *A History of India* (4th ed., 1909).

HOETZENDORF, hēts'en-dōrf, FRANZ, BARON CONRAD VON (1852–). An Austrian general, born at Penzing, the son of a colonel. He had a military education, became a lieutenant before he was 19, served as an officer of the general staff in Bosnia and Herzegovina in 1878–79 and against the South Dalmatian insurrection in 1882, taught tactics in the Austrian military academy at Vienna in 1888, and rose rapidly in rank. In 1906–11 and again after December, 1912, he was chief of the general staff, his resignation for the interval (when he was army inspector) being due to the opposition of the Archduke Francis Ferdinand. (See **WAR IN EUROPE** for his part in the military operations of 1914–15.) He wrote several books on tactics and infantry formations.

HOEVELL, hōō'vəl, WALTER ROBERT VAN, BARON (1812–79). A Dutch author and colonial statesman, born at Deventer. He studied theology at Groningen and in 1836 went to Bavaria, where in the following year he founded the *Tijdschrift van Nederlandsch-Indië*. For the emancipation of the slaves and for the spread of Christianity in the Dutch Indies Van Hoeffell accomplished much, especially by his writings. He also edited and translated various Malaysian poems, among which *Sjaïr Bidasari* (1843) deserves mention. But his greatest work was in colonial politics. From 1849 to 1854 he published *Reis over Java, Madura en Bali*, which joined a keen criticism of governmental methods of the time with a brilliant description of East Indian scenery and life. Returning to Holland in 1848, he was elected to the House of Deputies, where for 13 years he was leader of the

Liberal Colonial party. His parliamentary speeches delivered during this period (published 1862-66) are models. Van Hoevell was named Councilor of State in 1862. His sketches, *Uit het Indische leven* (1860; 2d ed., 1865), met with immense success and in 1868 were published in German.

HOEVEN, hoo'ven (HOOF'EN), JAN VAN DER (1801-68). A distinguished Dutch naturalist. He was born in Rotterdam, studied medicine and natural history at Leyden and Paris, became professor of zoölogy at Leyden in 1826, and held this position until his death. His most important work is his *Handboek der Dierkunde* (3 vols., 2d ed., 1846-55). An English translation, by Professor Clark of Cambridge, under the title *Handbook of Zoölogy*, was issued, with important additions by both the author and the editor, in 1856-58.—His elder brother, CORNELIS PRUYS (1792-1871), was professor of medicine in the University of Leyden and author of several important works, including: *De Historia Medicinæ* (1842); *De Historia Medicamentorum* (1847); *Etudes de la vie humaine* (1857).

HOE, hōf. A town of Bavaria, situated on the Saale, in Upper Franconia, 32 miles north-east of Bayreuth (Map: Germany, D 3). It has an attractive thirteenth-century church, recently restored, with fine glass windows, and an old Gothic Rathaus. There are a Gymnasium, opened in 1546, a city museum, and a hospital dating from 1260. The numerous textile manufacturing establishments produce chiefly cotton and woolen goods; but there are also manufactured machinery, iron and steel ware, dyes, carpets, celluloid, building stone, chemicals, vinegar, pottery, and leather. There is some trade in grain. The town has electric lights, water works, and canal communication. It was founded about the end of the eleventh century, as Regnitzhof. It was almost destroyed by fire in 1823. Pop., 1900, 32,781; 1910, 41,126, mostly Protestants.

HOEIJK, hōf'dik, WILLEM JACOBZON (1816-88). A Dutch poet and author, born at Alkmaar. His first work, a romantic poem, *Rosamunde* (1839), attracted the attention of Van Lennep, who obtained for him a clerk's position in the government offices at Alkmaar. Afterward he taught Dutch history and literature in the Gymnasium at Amsterdam. His works, which are in verse and prose, include the studies in Dutch history, *Geschiedenis der nederlandsche Letterkunde* (1853; 7th ed., 1886), *Historische Landschappen* (1856), *Geschiedenis des nederlandschen Volks* (1865-72), *Willem Frederik Hendrik, Prins der Nederlanden* (1880); and the poems, *De Bruidsdans* (1842), *De Jonker van Brederoode* (1849), and *Kennemerland, Balladen* (1850-52). He also wrote some poetical dramas, without much success. Consult Jan ten Brink for biography (Amsterdam, 1885), and C. J. B. Van der Duys, *W. J. Hofdijk in zijn leven en werken* (Edam, 1890).

HOER, hō'fēr, ANDREAS (1767-1810). A patriot leader of Tirol. He was born at Sankt Leonhard in the valley of Passeier, Nov. 22, 1767. His father was landlord of the inn Am Sand, and the son carried on the business, becoming known as the Sandwirt. In 1796 Hofer led a body of sharpshooters against the French on Lake Garda. He became a captain of the militia and in 1805 fought against Ney in the valley of Passeier, and after Tirol had been abandoned to France by the Peace of Pressburg

he was chosen as one of the secret deputation which was sent to Vienna to represent to the Archduke John the sufferings of the people and their wish to be reunited to Austria. But Austria was powerless, and in virtue of Napoleon's decree Tirol was made part of Bavaria. The patriots, however, did not lose heart, and, at the desire of the Archduke, Baron von Hormayr prepared for them a plan of insurrection. The rising took place in 1809, on the renewal of war between Napoleon and Austria. On April 11 Hofer defeated the Bavarian allies of France at Sterzing, and, after they had rallied during the early part of May, he beat them again in the neighborhood of Innsbruck, forcing them to evacuate Tirol. Napoleon, however, dispatched three armies to subdue the rebellious peasantry, who had been abandoned by the Austrians by the armistice of Znaim (July 12, 1809). At first Hofer concealed himself in the valley of Passeier, but later speedily renewed the defense of Tirol, and defeated the combined French and Bavarian forces under Lefebvre at Berg Isel (Aug. 13, 1809), driving them from the country. For two months Tirol was free, and Hofer acted as head of the government, but the Treaty of Schönbrunn (Oct. 14, 1809) resulted in a fresh invasion. The French and Bavarians poured into the country, and after an heroic struggle Hofer was obliged to take refuge in the mountains. Two months later (Jan. 28, 1810) he was betrayed into the hands of the French, conveyed to Mantua, and there shot, by order of Napoleon, after a summary trial. His family were indemnified for the loss of their property by the Emperor of Austria in 1818, and his son was ennobled. Hofer has been made the hero of tragedies by Auerbach and Immermann, and there are numerous patriotic songs about him in Tirol. Consult: J. F. Hormayr, *Das Land Tyrol und der Tyrolerkrieg von 1809* (Leipzig, 1845); K. F. Heigel, *Andreas Hofer* (Munich, 1874); Josef Egger, *Geschichte Tyrols* (Innsbruck, 1870-80); Cölest. Stampfer, *Sandwirt Andreas Hofer* (Freiburg, 1891).

HÖFER, hē'fēr, EDMUND (1819-82). A German novelist. He was born at Greifswald, was educated there, and in the universities of Heidelberg and Berlin. His first stories appeared in 1845, and from that time onward he wrote many novels marked by excellence of characterization and descriptions of north German landscapes. Later he wrote much, but not so well. Among his works may be mentioned: *Schwannwiek* (1856); *Bevoegtes Leben* (1856); *Norien: Brinnerungen einer alten Frau* (1858); *Die Honoratiorentochter* (1861); *Altermann Ryke* (1864); *Ein Findling* (1868); *Der Junker* (1878); *In der letzten Stunde* (1881). His selected works appeared in 14 volumes (1882 et seq.). Consult W. Raade's "Biographische Skizze," in *Ueber Land und Meer*, vol. xx, no. 27 (Stuttgart, 1868).

HOFF, hōf, JAKOBUS HENDRIKUS VAN 'T. See VAN 'T HOFF.

HÖFFDING, hēv'ding, HARALD (1843-). A Danish philosopher, born and educated in Copenhagen. He was a school-teacher between 1861 and 1871, in the latter year became instructor, and in 1883 professor, in the University of Copenhagen. He received honorary degrees from several European universities, among them Oxford (1904) and Cambridge (1909).

Early influenced by Kierkegaard, he held to a distinction between knowledge and belief; but later he became a positivist, though to the views of that school he applied the methods of critical philosophy and the results of psychological study. In ethics he is a utilitarian of a moderate type. His principal works are: *Den engelske Filosofi i vor Tid* (1874); *Etik* (1887; 3d ed., 1905; Ger. trans., Leipzig, 1888); *Psychologi i Omrids paa Grundlag af Erfaring* (1882; 5th ed., 1905; trans. into many languages); *Formal Logik til Brug ved Forelæsninger* (1889; 5th ed., 1907); *Psykologiske Undersøgelser* (1889); *Kontinuiteten i Kants filosofiske Udviklingsgang* (1893); *Den nyere Filosofis Historie* (2 vols., 1894-95; Ger. trans., 1907; Eng. trans., 1912); *Rousseau und seine Philosophie* (1901); *Det psykologiske Grundlag for logiske Domme* (1899); *Religionsfilosofi* (1901; 2d ed., 1906; Eng. trans., 1906); *Mindre Arbejder* (2 vols., 1899-1905); *Problems of Philosophy* (1905); *Den menneskelige Tanke dens Former og dens Opgaver* (1910); *Modern Philosophers* (Eng. trans., New York, 1914). His textbooks in philosophy are widely used. Consult: C. N. Starcke and G. Saxild in *Tilskueren* (March, 1903); G. Brandes, *Samlede Skrifter*, xv (1905); A. Ipsen, *Litterære Portrætter* (1906).

HOFFMAN, CHARLES FENNO (1806-84). An American poet and novelist, born in New York City. In early youth he had his leg crushed and amputated, but was not deterred thereby from athletics and an open-air life. He attended, but did not graduate from, Columbia College, was admitted to the bar at 21, and practiced three years, after which he devoted himself to literature. In 1833 he established the *Knickerbocker Magazine*, but soon gave it up and became editor of the *American Monthly*, which he conducted for several years. Afterward he edited for short periods the *Mirror* and the *Literary World*. His first book was *A Winter in the West*, (1835), which was followed by *Wild Scenes in Forest and Prairie* (1837)—both based upon actual experiences in search of health. He now wrote a few novels, the most important being *Greyslaer* (1840), founded upon the murder of Colonel Sharpe by Beauchamp—a theme which a little later attracted Simms (q.v.). But his fame rested chiefly upon his poems, first collected in *The Vigil of Faith* (1842), and especially his songs, which were once deservedly popular. Among them may be named "Rosalie Clare" and "Monterey." A complete edition of his poems appeared in 1874. In 1849 he became insane and for the remainder of his life was confined in an asylum.

HOFFMAN, DAVID (1784-1854). An American lawyer and author. He was professor of law in the University of Maryland from 1817 to 1836, traveled much abroad, and received honorary degrees from Oxford and Göttingen. Among his publications are: *A Course of Legal Study* (1817); *Legal Outlines* (1836); *Miscellaneous Thoughts on Men, Manners, and Things*, by "Anthony Grumbler" (1837); *Chronicles Selected from the Originals of Cartaphilus, the Wandering Jew* (1853), a work designed to present through the legend of the Wandering Jew a history of government and religion since the time of Christ.

HOFFMAN, EUGENE AUGUSTUS (1829-1902). An American Protestant Episcopal clergyman, born in New York City and educated at Rutgers

and Harvard colleges and at the General Theological Seminary. He was rector successively of Christ Church, Elizabeth, N. J.; St. Mary's Church, Burlington, N. J.; Grace Church, Brooklyn Heights; and St. Mark's Church, Philadelphia. In 1879 he was appointed dean of the General Theological Seminary, New York, and in connection with his family heavily endowed that institution. He wrote *Free Churches* (1858) and *The Eucharistic Week* (1859 and 1893). Consult T. M. Riley, *Memorial Biography of E. A. Hoffman* (New York, 1904).

HOFFMAN, FREDERICK LUDWIG (1865-). An American statistician, born at Varel, Germany. In 1894 he became statistician of the Prudential Insurance Company of America, and in 1911 he was president of the American Statistical Association. His publications include: *Sanitary Conditions of the Tenements of Trinity Church, New York* (1895); *Tornadoes and Tornado Insurance* (1896); *The Race Traits and Tendencies of the American Negro* (1896); *History of the Prudential Insurance Company of America* (1900); *Fatal Accidents in Coal Mining* (1910); *Insurance Science and Economics* (1911); *Fifty Years of Life Insurance Progress* (1911); *Statistical Experience Data of the Johns Hopkins Hospital* (1913); *Menace of Cancer* (1913).

HOFFMAN, RICHARD (1831-1909). An American pianist, composer, and teacher. He was born in Manchester, Lancashire, England, but after his sixteenth year resided in New York City. His earliest instruction was received from his father and subsequently from Meyer, Pleyel, Moscheles, Rubinstein, Thalberg, Döhler, and Liszt. Within a year of his arrival in America he made a tour of the country and later accompanied Jenny Lind on her tours. He was an exceedingly popular concert pianist and played with Gottschalk and afterward with Von Bülow (New York, 1875). He settled down to teaching and became one of the most important factors in American musical life. His compositions consist of pianoforte music, part songs, ballads, anthems, and Church music generally.

HOFFMAN, WALTER JAMES (1846-99). An American ethnologist. He was born at Weidaville, Pa., studied medicine at Jefferson College, Philadelphia, and practiced it in Reading, Pa., till 1870, when he went to the Franco-Prussian War as a surgeon with the German army. On his return he took a similar position with the United States troops and thus obtained opportunities for natural-history researches in Arizona, Nevada, and Dakota. In 1877 Hoffman was attached to the Geological Survey and two years afterward became assistant in the Bureau of Ethnology at its formation.

HOFFMAN, OR, THE REVENGE FOR A FATHER. A tragedy by Henry Chettle, performed in 1602.

HOFFMANN, hōf'mān, AUGUST HEINRICH, called **HOFFMANN VON FALLERSLEBEN**, fōn fāl'ers-lä'bēn (1798-1874). A German poet, philologist, and literary historian, born at Fallersleben. He was educated at Göttingen and Bonn and from 1823 to 1838 was librarian at the University of Breslau, where he was also professor of the German language from 1830 till his dismissal (1842) for his *Unpolitische Lieder* (1841-42). He was restored to his rights as a Prussian citizen in 1848, having passed the intervening years in wanderings till 1845, when he settled in Mecklenburg. He married in 1849 and afterward lived

at Bingerbrück, Neuwied, and Weimar, where he was an editor of the *Weimarische Jahrbuch*. From 1860 till his death he was librarian of the Duke of Ratibor at Korvei. Popular at first as a liberal political poet, he is cherished still for the ease, simplicity, and grace of songs of common life (for many of which he also composed melodies), sometimes of patriotic appeal, as the popular "Deutschland, Deutschland, über alles." Hoffmann was a diligent student and editor of early German classics (*Reineke Vos*, *Monumenta Elnonensia*, *Theophilus*), made valuable contributions to philology, now mostly of antiquarian interest, and to literary history. In 1868-70 Hoffmann published *Mein Leben*, an autobiography in six volumes. His complete works were issued by Gerstenberg in eight volumes (1890-93). His *Briefe an Ferdinand Wolf* were published in 1874. Consult: *Life* by J. M. Wagner (Vienna, 1869); Kreyenberg in *Preussische Jahrbücher* (Berlin, 1891); H. Gerstenberg, *Henriette von Schuëchenberg und H. von Fallersleben* (ib., 1903).

HOFFMANN, ERNST THEODOR AMADEUS (originally **WILHELM**) (1776-1822). An eccentric but brilliant German romantic novelist of cosmopolitan reputation and influence, born at Königsberg. His foremost characteristic is his wayward yet keen fancy, suggesting at once Hawthorne and Poe. He dealt by preference with the grotesque, startling, and marvelous, until towards the close of his life morbidity verged on madness. After a joyless childhood he prepared carefully for the law, although he wished to become a composer, lost his position in Posen because of some witty caricatures, and suffered from penury and dissipation. He eked out a living by scene and portrait painting and musical composition and criticism in Posen, Warsaw, Bamberg, Leipzig, Dresden, and Berlin, where in 1816 he became councilor of the Court of Appeals. He was a brilliant lawyer. For short intervals he was manager and musical director also. His first book was a collection of musical criticisms with illustrations, *Phantasiestücke in Callots Manier* (1814-15), in which appear the stories *Ritter Gluck*, *Don Juan*, and *Das Märchen vom Goldenen Topf*. In 1816 appeared the novel *Die Elivire des Teufels*, which, with the unfinished novel *Lebensansichten des Katers Murr* (1820-22), is the most famous of his works. Other noteworthy volumes are *Die Serapionsbrüder* (1819-21), containing many stories, and *Nachtstücke* (1817). All are alike characterized by a lyric swing and an erratic imagination that is mentally disquieting and yet blended with shrewd satire, wit, and even wisdom. He died of disease induced by dissipation, his mind at times clear, and clinging tenaciously to a life that ebbed away inch by inch. Hoffmann's *Works* are in 15 volumes (2d rev. ed., 1905). A complete edition of his musical compositions was issued by E. Istel (1906). Of the more popular, there are many editions. The *Elivire des Teufels* has been translated into English (1824), also *Der goldene Topf* (The Golden Pot), one of the *Phantasiestücke*, by Carlyle in his *German Romance* (Edinburgh, 1827), with a biographical sketch. Other translations are by Gillies (London, 1826), Bealby (New York, 1885), and Ewing (London, 1886). Consult: Z. Funck, *Erinnerungen* (Leipzig, 1836); Hitzig, *Hoffmanns Leben und Nachlass* (Stuttgart, 1839); Hans Wolzogen, *E. T. A. Hoffmann u. R. Wagner* (Berlin, 1906); Arthur Sakheim, *E. T.*

A. Hoffmann: Studien zu seiner Persönlichkeit und seinen Werken (Leipzig, 1908).

HOFFMANN, FRIEDRICH (1660-1742). A German physician, one of the most celebrated of the eighteenth century. He was born at Halle and received his medical degree in 1681 at Jena. He then studied chemistry at Erfurt under Kaspar Cramer, practiced at Minden and Halberstadt with great success, and was professor of medicine in the University of Halle from 1693 to 1742. In 1708 he became physician to the King of Prussia at Berlin and subsequently enjoyed a European reputation second only to that of Boerhaave. His name is perpetuated in the title "Hoffmann's anodyne." (See *ETHER*.) His greatest work was *Medicina Rationalis Systematica* (1718-40); *Opera Omnia Physico-Medica denuo Revisa, Correcta et Aucta* (1740) and *Medicini Consultatoria* (1721-39) were also celebrated, together with the *Opuscula*, published after his death and reprinted at Venice in 17 volumes in 1745 and subsequently at Naples.

HOFFMANN, GUSTAV (known as **GRABEN-HOFFMAN**) (1820-1900). A German composer, born at Bnin, near Posen. He was the pupil of Stümer in Berlin, and afterwards of Hauptmann at Leipzig in singing, and acquired a reputation in barytone parts in concert and oratorio. He taught vocal music and composed nearly a hundred books of songs and choral music, besides publishing several textbooks on voice training. His best-known song is "Fünfhunderttausend Teufel." In 1885 he settled at Potsdam, where he founded a singing school for women.

HOFFMANN, HANS (1848-1909). A German novelist, born in Stettin. He studied philology at the universities of Bonn, Berlin, and Halle, and made a long visit to Italy and Greece. For some time he was a Gymnasium teacher. He is one of the most gifted of the modern German novelists and unites with an uncommon talent for vivid descriptions of landscapes a poetical and delightful humor. He died while secretary of the Schiller Foundation in Weimar. Among his works are: *Der Hennenprediger* (1883), his best work; *Ivan der Schreckliche und sein Hund* (1889); *Von Frühling zu Frühling* (1889, 1898); *Tante Fritzchen* (1899); *Geschichten aus Hinterpommern* (1891); *Irrrende Mutterliebe* (1900); *Der eiserne Rittmeister* (1900); *Das Gymnasium zu Stolpenburg* (1900); *Von Haff zu Haff* (1903); and the lyrics *Vom Lebenswege* (Leipzig, 1893). Consult Otto Ladendorf, *Hans Hoffmann* (Berlin, 1908).

HOFFMANN, or HOFFMANN-DONNER, dōn'ēr, HEINRICH (1809-94). A German humorous poet, born in Frankfort-on-the-Main. At his marriage he added his wife's name (Donner) to his own. He studied medicine at the universities of Heidelberg, Halle, and Paris, then became a teacher of anatomy in the Senckenberg Institution in Frankfort-on-the-Main, and from 1851 till 1889 was directing physician of the municipal insane asylum. He wrote on medical subjects, but is far better known through his children's books, which he illustrated himself. The most famous of these, *Struwwelpeter* (1845; 250th ed., 1903), has been widely translated. A parody of this famous work by E. V. Lucas in 1914 was one of the most agreeable books produced by the war in Europe. He also published *König Nussknacker* and a volume of poems, *Auf heitern Pfaden* (1873).

HOFFMANN, JOHANN JOSEPH (1805-78). A German Oriental scholar. He was born at Würzburg, where he was educated. He became an actor in 1825, but in 1830 his attention was diverted to Oriental philology by Philipp Franz von Siebold (q.v.). He completed his studies under a Chinese instructor, became Japanese translator for the Dutch Colonial Minister, and later was made professor of Chinese and Japanese at the University of Leyden. He published a Japanese grammar in both Dutch and English in 1867 and republished it in German and English in 1876. He is author also of *Japanische Studien* (1878).

HOFFMANNITES. See FRIENDS OF THE TEMPLE.

HOFFORY, hó'fó-ré (JOHN PETER), JULIUS (1855-97). A Danish-German philologist, phonetician, and Germanic scholar, born at Aarhus, Denmark. He was educated at Copenhagen, Berlin, and Strassburg. In 1883 he was made professor of Norse philology and phonetics at the University of Berlin. In 1889 his health broke down, and in 1893 he had to enter a sanitarium near Berlin, where he died in 1897. He wrote: *Eddastudien* (1889); "Phonetische Streitfragen," in the *Zeitschrift für vergleichende Sprachforschung*, vol. xxiii, and *Professor Stevers und die Principien der Sprachphysiologie* (1884), both attacks on Sievers. He edited and translated into German some of Holberg's comedies under the title of *Dänische Schaubühne* (1885-87), and translated other Danish writings in *Nordische Bibliothek* (1889-91). He did much towards the introduction of Ibsen into Germany. Consult Henning, *Acta Germanica* (Berlin, 1898), and R. M. Meyer, *Goethe-Jahrbuch*, No. 19 (Frankfort-on-the-Main, 1898).

HOFHUF, hō'foof. See EL-HOFUF.

HÖFLER, hē'fler, KARL ADOLF KONSTANTIN VON (1811-97). A German historian. He was born at Memmingen and studied at the universities of Munich and Göttingen. For two years (1834-36) he was in Rome and Florence, making historical researches. When he returned to Munich, he directed the *Münchener Zeitung*, the official journal of Bavaria. Three years afterward he was made a professor at the university there. He became involved in the political troubles of Bavaria, and the publication of his *Konkordat und Konstitutionseid der Katholiken in Bayern* (1847), together with his active part in the agitation against Lola Montez, lost him his Munich chair; but, after being archivist at Bamberg for a time, he was made professor of history in the University of Prague (1851). In the controversy between the Czechs and the Germans Höfler sided conspicuously with the Germans, and in 1872 he was called into the Austrian House of Peers. His numerous historical publications include: *Die deutschen Papste* (1839); *Lehrbuch der allgemeinen Geschichte* (1850-56); *Papst Adrian VI.* (1880); *Monumenta Hispanica* (1881-82); *Die Ära der Bastarden am Schlusse des Mittelalters* (1891).

HOFMANN, hóf'mán, AUGUST WILHELM VON (1818-92). A distinguished German chemist, born at Giessen. After obtaining the degree of Ph.D., he became assistant to Liebig in the Giessen laboratory, and in 1845 became a docent in chemistry in the University of Bonn. In the same year the Royal College of Chemistry was established in London, and Hofmann was recommended by Liebig as highly qualified for the post of director of the new institution. This

college, which subsequently became part of the Royal School of Mines, owes much of its high reputation to Hofmann's activity. On the promotion of Thomas Graham from the post of chemist to the mint to the office of master of that institution, Hofmann was appointed his successor. In 1861 he was elected president of the London Chemical Society. In 1865 Hofmann accepted the chair of chemistry in the University of Berlin and in 1868 founded the German Chemical Society. He was ennobled in 1888. He served as judge at several industrial expositions, of which he published admirable accounts, and was a member of many scientific bodies at home and abroad.

The results of his brilliant researches have formed entire departments in organic chemistry and have had an important influence on the development of chemical theory. He investigated the organic bases obtained from coal tar and discovered a new and important class of compounds (the amines, q.v.) which are derived from ammonia by the substitution of organic radicals for hydrogen atoms. One of his best-known contributions was a method (known as *Hofmann's reaction*) for the transformation of acid amides into amines by the action of bromine and caustic potash. Among his most important discoveries are that of aniline among the products of destructive distillation of bituminous coal and the discovery of methods for the artificial preparation of beautiful coloring substances from aniline. He obtained the colorless base known as *rosaniline* and its colored salts, such as *fuchsin*, *dahlia* (*Hofmann's violet*), etc. These discoveries have contributed greatly to the development of the color industry and have practically revolutionized the art of dyeing. Among his contributions to physical chemistry may be mentioned his method of determining the vapor densities of chemical substances for the purpose of obtaining their molecular weights, and a method of demonstrating the dissociation of gases, such as carbonic-acid gas and water vapor, by the action of electric sparks. Hofmann was a brilliant teacher, and his *Introduction to Modern Chemistry* (1865, and several later editions) brought about important reforms in the methods of teaching chemistry. He also wrote: *A Handbook of Organic Analysis* (1853); *The Life Work of Liebig in Experimental and Philosophic Chemistry* (1876); *Zur Erinnerung an vorangegangene Freunde* (1889); etc. Consult Volhard and Fischer, *August Wilhelm von Hofmann: Ein Lebensbild, im Auftrage der deutschen chemischen Gesellschaft* (Berlin, 1902).

HOFMANN, FRANZ ADOLF (1843-). A German hygienist. He was born in Munich, studied medicine there, and was assistant in the physiological institute of the university until 1872, when he went to Leipzig as head of the university laboratory of pathological chemistry. Six years afterward Hofmann was appointed professor of experimental hygiene and director of the hygienic institute at Leipzig, and he continued to hold his chair after resigning from administrative work. An editor of the *Archiv für Hygiene*, he contributed to that journal, to the *Zeitschrift für Biologie*, and to the *Vierteiljahrsschrift für öffentliche Gesundheitspflege*, on pathological chemistry, on the properties of subterranean waters, and on disinfection, refrigeration, and the preservation of foods, especially meats.

HOFMANN, HEINRICH (1824–1902). A German historical painter, born in Darmstadt. He was a pupil of Theodor Hildebrandt and Schadow at Düsseldorf and of the Antwerp Academy. After visiting Italy in 1854–58, where he came under the influence of Cornelius, and practicing in different German cities, he settled in 1862 at Dresden, where he became professor at the academy. Although his subjects are drawn from the entire domain of literature and mythology, his extensively engraved scenes from the life of Christ are most widely known. Among these are: "Christ Taken Prisoner" (1858, Darmstadt); "The Adulteress before Christ" (1863, Dresden); "Christ's Sermon on Lake Gennesaret" (1875, Berlin); "Christ in the Temple" (1882, Dresden). In 1878–79 he decorated the ceiling of the vestibule in the Dresden Theatre with "Apotheosis of the Heroes of the Greek Drama." Hofmann's pictures are not distinguished by any unusual technical qualities, but owe their popularity entirely to his illustrative talent and ideal conceptions of biblical events.

HOFMANN, JOHANN CHRISTIAN KONRAD VON (1810–77). A German Lutheran theologian and historian, born in Nuremberg. He studied history and theology at the universities of Erlangen and Berlin and in 1833 was appointed a teacher in the Gymnasium at Erlangen. Two years later he became a privatdocent in the theological faculty of the university and in 1841 professor extraordinarius. The next year he accepted a call as full professor to Rostock, but in 1845 returned to Erlangen. In 1857 he was ennobled. He was the head of the so-called Erlangen school, which developed the theological ideas of Bengel, and in the end conformed in all essential respects with the doctrines of the Lutheran church. As a member of the Second Chamber of the Bavarian Legislature, he labored for the union of Germany and was, despite his clerical conservatism, a member of the Liberal party. His writings include: *Lehrbuch der Weltgeschichte* (2d ed., 1843); *Weissagung und Erfüllung im alten und neuen Testament* (2d ed., 3 vols., 1857–60); *Die heilige Schrift neuen Testaments, zusammenhängend untersucht* (1862–86, the latter part edited by Vlock); *Der Schriftbeweis* (2d ed., 1857–60). Consult Grau, *Johann Christian Konrad von Hofmann: Erinnerungen* (Gütersloh, 1879).

HOFMANN, JOSEF (1877–). A celebrated Polish concert pianist, born in Cracow, Galicia. His father was a leading musician of Warsaw, in which city he held the position of professor of harmony and composition at the conservatory and also the directorship of the opera. Josef studied with his father until he was 15 years of age, after which he spent two years with Rubinstein. As a child, he was one of the most remarkable musical prodigies ever known; at the age of six years he had made his public début, and by the time he was nine had toured continental Europe and Great Britain, and in 1887–88 he visited America. On the conclusion of the last-named tour he went into retirement for further study and preparation and in 1894 made his reappearance at Dresden and subsequently toured every civilized country. On his reappearance in New York in 1901 he showed a vastly improved technique and great interpretative ability. Among his contemporaries no pianist was his superior. He is equally at home in the interpretation of all

schools of music—classic, romantic, or modern. Although he never taught music, he published two little books, *Piano Playing* and *Piano Questions Answered*, the principal merit of which is their eminent practicability. He composed several attractive numbers for the piano and also five concertos.

HOFMANN, KONRAD (1819–90). A German philologist, born near Bemberg. He studied medicine at Munich and Erlangen and philology at Munich, Leipzig, Berlin, and Paris. In 1852 he was put in charge of the materials gathered by Schmeller among the manuscripts in the library of Munich. In the following year he succeeded Schmeller as professor of Germanic philology, assuming in 1860 also the chair of Romance philology. Most of his writings were for journals, especially the publications of the Munich Academy, *Romanische Forschungen*, and Pfeiffer's *Germania*. His other works are editions of the *Hildebrandlied* (1850), with Vollmar; *Amis et Amiles, Jourdain de Blairies* (last ed., 1882); *Primavera y Flor de Romances* (1856), with Wolf; *Karls des grossen Pilgerfahrt* (1866); *Joufrois* (1880); Lutwin's *Adam und Eva* (1881), with Meyer; *Chanson de Roland* (not published); and the critical works *Ueber die Gründung der Wissenschaft altdeutscher Sprache und Litteratur* (1857) and *Zur Textkritik der Nibelungen* (1872).

HOFMANN, MELCHIOR (c.1498–c.1544). A German Anabaptist, born at Hall in Swabia. He was a furrier at Livland, but under the influence of Luther became a lay preacher and in 1524 visited Sweden. From this country, however, he was expelled, and he was also driven from Dorpat in the same year. But Frederick I of Denmark appointed him to preach at Kiel. For a short period he enjoyed the favor of Luther, whom he visited at Wittenberg; but in 1529, because of his view of the Eucharist, he was attacked by Luther and his adherents. He preached at Strassburg and afterward in East Friesland. Upon his return to Strassburg in 1533 his Anabaptist doctrines had become so pronounced that he was placed in prison, and there he died.

HOFMANNSTHAL, höf'mäns-täl, Hugo von (1874–). An Austrian poet. He was born of wealthy parents in Vienna and studied law, then literature and the languages, at the university of that city; but he early turned his attention entirely to literary work. His first venture, written under the pseudonym of Theophil Morren, when he was 18, a short lyric-dramatic study called *Gestern* (1892; 2d ed., 1904), he has hardly surpassed. His brief drama *Der Tod des Tizian* (1901; 4th ed., 1908) was successful and remains one of his best works. After the appearance of the plays *Theater in Versen* (containing *Die Frau im Fenster*, *Die Hochzeit der Sobeide*, *Der Abenteuerer und die Sängerin*, 1899), *Der Tor und der Tod* (1900), *Der Kaiser und die Here* (1900), *Das Bergwerk zu Falun* (1900), and *Das kleine Welttheater, oder die Glücklichen, ein Puppenspiel* (1903), Hofmannsthal tried something more serious in his imitations of Greek tragedy, *Elektra* (1903), *Ödipus und die Sphinx* (1906), *Alkestis* (1911), and in his *Das gerettete Venedig, nach Thomas Otway* (1904), with promising but not permanent success. He has a flowing, graceful style, which, however, soon palls with its sweetness, and his characters almost never approach real life. In this he is true to his stated principle,

that art and life lie far apart. His gift is lyric rather than dramatic. Among his other works may be mentioned: *Ausgewählte Gedichte* (1903; 2d ed., 1904); *Das Märchen der 267. Nacht, und andere Erzählungen* (1904); *Viktor Hugo* (1904); *Vorspiele* (1908); *Prosaische Schriften* (1907); *Der Rosenkavalier* (1911), the libretto of a popular opera, which, with music by R. Strauss, had its first New York performance in 1913; *Jedermann, ein altes Spiel erneuert* (1912); *Ariadne auf Naxos* (1912). Consult: Sulger-Gebing, *H. von Hofmannsthal* (Leipzig, 1905); Borchhardt, *Rilke und Hofmannsthal* (ib., 1905); Köllmann, *H. von H.* (ib., 1907); Hladny, *Hofmannsthals Griechenstücke* (Vienna, 1910).

HOFMANNSWALDAU, hōf'māns-vāl'dou, CHRISTIAN HOFMANN VON (1617-79). A German poet, born in Breslau; the chief representative of the so-called second Silesian school. He studied law at Leyden and then traveled through the Netherlands, England, France, and Italy. On his return, and before he had reached the required age, he was made a member of the Breslau city council. His poetry was greatly influenced by the Italians Guarini and Marino and departed more and more from the somewhat insipid and tasteless style of the previously authoritative Martin Opitz (q.v.). Witty and endowed with considerable literary skill, he was much admired; his love lyrics were often imitated, and many editions of them were published. His style is pompous, bombastic, and highly artificial. Although of clean reputation himself, his poems cannot boast of that virtue. Selections from his poems are given in vol. xxxvi of Kürschner's *Deutsche Nationalliteratur*. Consult: Josef Ettlinger, *Christian Hofmann von Hofmannswaldau* (Halle, 1891); Brossmann, *Hofmann von Hofmannswaldau* (Leipzig, 1900); P. Hintringer, *Sprach- und textgeschichtliche Studien zu H. von H.* (Breslau, 1908).

HOFMEISTER, hōf'mī-stēr, FRANZ (1850-). A German chemist, born at Prague, Bohemia, and educated at the universities of Prague, Leipzig, and Strassburg. At Prague he became an assistant in medical chemistry in 1872, lecturer in 1879, and professor of pharmacology in 1883. In 1896 he became director of the physiological-chemistry department at Strassburg. His investigations deal with action of salt in the body, assimilation of nourishment, metabolic assimilation of tissues, supply and use of albumen in organisms, and other problems in physiological chemistry. He published *Leitfaden für den praktisch-chemischen Unterricht der Mediziner* (3d ed., 1908).

HOFMEISTER, WILHELM (1824-77). A German botanist, born at Leipzig. He has the reputation of being the father of modern morphology, i.e., the morphology of life histories and phylogeny. He was by profession a druggist and entirely self-trained in botany, having no university connection until long after his most famous contributions had appeared. His work was done during a period of revolution and foundation laying in every department of botany, and as a consequence he lived in the midst of violent opposition on the part of the established order. When 25 years old (1849), he published one of his two greatest works, *Die Entstehung des Embryo der Phanerogamen*, which corrected a remarkable misapprehension concerning the embryo of seed plants. In 1851

appeared his most famous work, under the title *Vergleichende Untersuchungen höherer Kryptogamen und der Koniferen*, an English translation of which, by Frederick Curry, was published in 1862 by the Royal Society. This, his epoch-making contribution, bridged the great gulf which was thought to separate cryptogams and phanerogams. The methods he had used in studying embryo formation in seed plants were applied to the embryology of Bryophytes and Pteridophytes, and in the course of this investigation he brought out with remarkable clearness, and for the first time, what is now called alternation of generations (q.v.). The estimate of this work given by Sachs is as follows: "These results were magnificent beyond all that has been achieved before or since in the domain of descriptive botany. The many valuable details are lost in the splendor of the total result." The idea of what is meant by the development of a plant was suddenly and completely changed. The intimate connection of all groups, from liverworts to angiosperms, was seen in all of its relations with a distinctness never before attained. When Darwin's theory of natural selection was given to the world, eight years after Hofmeister's investigations, the relations of affinity between the great divisions of plants were so well established and so evident that the theory of descent had only to accept what Hofmeister's morphology had actually brought to view. All of these results were obtained before he achieved his first university position, which was the professorship of botany at Heidelberg (1863-72). Later (1872-77) he was professor of botany at Tübingen. After he entered upon his career as a teacher, his work seems to have deteriorated; at least his investigations dealt with subjects of minor importance.

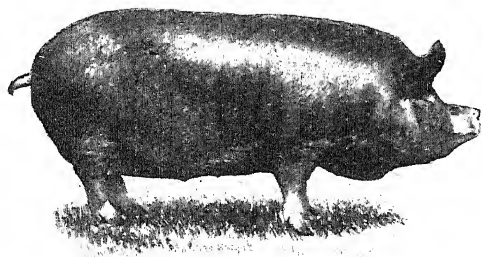
HOFMEYER, hōf'mī'ēr, JAN HENDRIK (1845-1909). A South African politician, born at Cape Town, South Africa, and educated at the South African College. He edited the journals *Volksvriend*, *Zuid Afrikaan*, and *Zuid Afrikaansche Tijdschrift*; organized the Boeren Vereeniging (Farmers' Association) in 1878; and when the Afrikaner Bond was formed in 1882 he gained control of it and amalgamated the two societies, thereby becoming the leader of the Dutch residents of Cape Colony. From 1879 to 1895 he was a member of the Cape Parliament, and in 1882 he served in Scanlon's ministry. At the first colonial conference in London, in 1887, he proposed an Imperial customs federation. Two years later he was a member of the South African customs conference, and in 1890 he negotiated the Swaziland Convention. He brought about the conference between Lord Milner and President Kruger at Bloemfontein, and later he personally visited that city and Pretoria in his efforts to prevent war between England and the Transvaal. After the war he favored conciliation and was one of the delegates sent to London in 1909 to make final arrangements for the South African union. Consult the *Life* by J. H. Hofmeyr (London, 1914).

HOFSTEDE DE GROOT, hōf'stā-de de grōt, PETRUS (1802-86). A Dutch theologian and reformer, born at Leer in East Friesland, Prussia. In 1826 he became pastor at Ulrum and in 1829 professor of theology in Groningen. He was the head of the so-called Groningen school, the members of which style themselves the Evan-

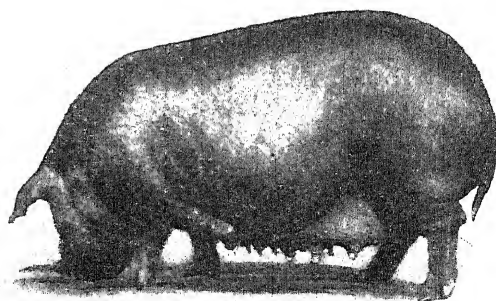
STANDARD BREEDS OF HOGS



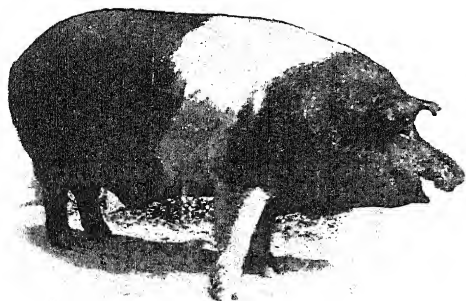
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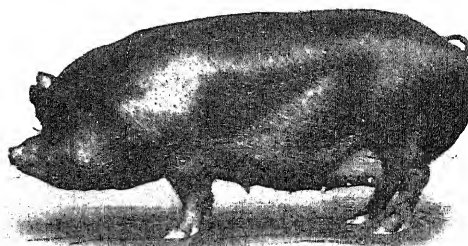
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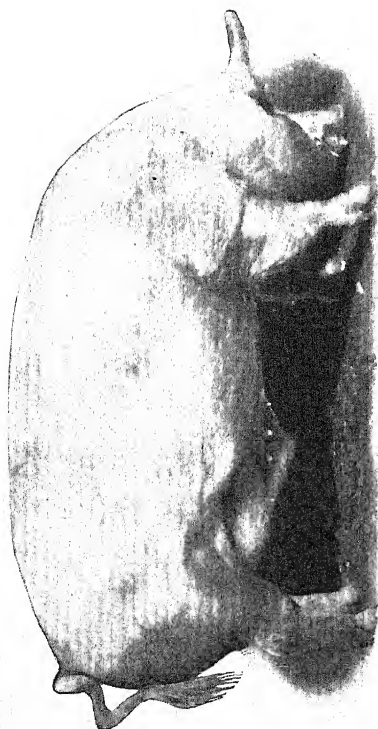
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1. A TRIO OF DUROC SOWS

2. BERKSHIRE SOW
4. HAMPSHIRE BOAR

3. MULEFOOT SOW
5. ESSEX SOW

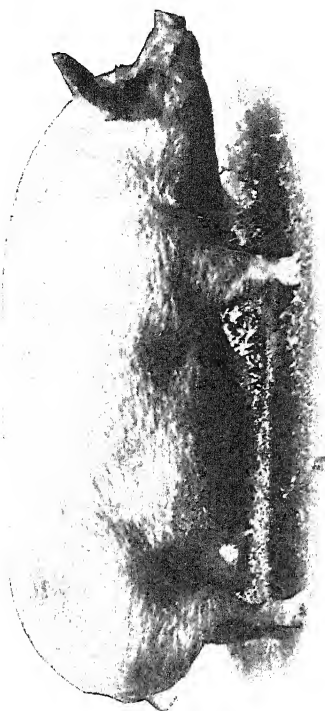
STANDARD BREEDS OF HOGS



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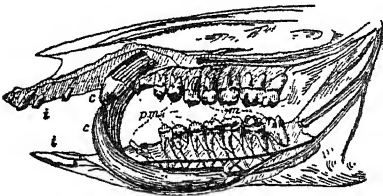
1. YORKSHIRE BOAR
3. POLAND-CHINA BOAR

2. CHESHIRE SOW
4. CHESTER WHITE SOW

gelicals and form a middle Church party between the moderns and the orthodox, although they lean more towards the latter. The party organ was the *Waarheid en Liefde*, of which Hofstede was an editor. His writings include: *Opvoeding der Menschheid* (2d ed., 1855); *Institutio Theologiæ Naturalis* (4th ed., 1861); *Die Groninger Theologen* (1854); *Over de evangelisch-catholieke godgeleerdheid als de godgeleerdheid der toekomst* (1856); *Die moderne Theologie in den Nederlanden* (1870). Consult Heerspink, *Dr. Petrus Hofstedes leven en werken* (Groningen, 1897).

HOFUF. See EL-HOFUF.

HOG, THE DOMESTIC (probably from *hog*, *hag*, to cut, Icel. *hoggrva*, Swed. *hugga*, AS. *hæawan*, OHG. *houwan*, Ger. *hauen*, to hew; connected with OChurch Slav. *kovati*, Lith. *kauti*, to strike, to forge; referring ordinarily to a castrated boar). All the known breeds of domestic swine (see SWINE, for the general natural history of the race) may be divided into two groups—the European hog (*Sus scrofa*), which is sprung from and resembles the wild boar; and the Asiatic pigs, regarded as descended



DENTITION OF THE WILD BOAR.

Right upper and lower jaws, with their teeth and their nerves, exposed from the inside: *t*, *i*, incisors; *c*, *c*, canines (tusks); *pm*, premolars; *m*, molars.

from the Indian wild boar (*Sus cristatus*). The common hog (*Sus scrofa*) appears to be a native of most parts of Europe and Asia, and domesticated swine were found by the first navigators in many islands of the southern seas. Although the use of its flesh was prohibited to the Jews, and the prohibition has been adopted in the Mohammedan law, it constitutes a large part of the food of many nations. The fecundity of the hog is great; with proper treatment it will produce two litters annually, generally of four to eight pigs each, although sometimes there are as many as 14 in a litter. The period of gestation is usually 16 weeks. Great quantities of the flesh and fat are consumed in various forms as pork, fresh or salted, bacon, ham, and lard. Hog skin is made into leather, which is highly esteemed. The bristles are much used for brush making.

Breeds. Numerous breeds of the domestic hog have resulted from selection and crossing and from conditions of environment favorable to improvement. Apparently there were two original or native breeds in Great Britain—the old English hog and a breed found in the Highlands of Scotland. From these our modern improved breeds have been developed by crossing the native breeds with foreign hogs, principally the Chinese and Neapolitans. The modern white breeds, with fine bone, thin skin, short legs, and tendency to fatten at an early age, take these qualities from the Chinese hog; while the black breeds, of which the Essex is a type, get their qualities from the Neapolitan stock.

The *Yorkshire* is the principal of the English

white breeds and is divided into three subvarieties—the Large Whites, or Large Yorkshires, the Middle Whites, and the Small Whites, or Small Yorkshires, which are considered the smallest and finest of the white breeds. They mature early and fatten quickly. The Large Whites are characterized by immense size, although the best are rather fine-boned and not coarse. The Yorkshires are very popular in England, and white swine generally are preferred in that country. It is said that from this source came the American breed of Chester Whites, which was originated in Chester Co., Pa. Pigs of this breed are among the largest, and individuals have attained a weight of 1300 pounds.

The *Berkshires* are popular and widely disseminated. This breed is of English origin and takes its name from the county whence it came. It is of large size, black in color with white on the face and occasional splashes elsewhere, and fattens readily at any age. Great improvement has been made in its size and symmetry in recent years. The quality of the pork is unexcelled.

The *Poland-Chinas* divide honors with the *Berkshires* in the great pork-producing sections of the United States. This is also a black breed and is a purely American one, originating in Ohio. It is not generally believed that any Polish cross was ever introduced in its development, in spite of its name. As now bred, the *Poland-Chinas* are similar to the *Berkshires*, but show rather more white in their markings. They are among the largest of hogs, but have been much improved in fineness of bone, early maturity, and tendency to fatten at an early age.

The *Duroc-Jerseys* are the result of uniting several families of red pigs which were bred in New York and New Jersey. Though the color is red, the shades vary considerably. The body, as a whole, resembles the *Poland-China*. The breed has become very popular in recent years. The *Cheshires* are a medium-sized white breed which originated in New York. Though possessed of many good qualities, it has not been popular in the West. The *Thin Rind*, or *Hampshire*, is a good bacon pig of American origin. The color is black with a white band about the body. The *Tamworth* is a large, coarse, "leggy" hog, of a dark chestnut color, more or less spotted with black. This animal has been widely exploited as a bacon hog. It originated in England, but is popular in America. The *Victorias* are a white breed of medium size, not widely raised in the United States; and the *Essex* is a black English breed, classed among the smaller breeds. It has not become popular in the United States. The *Small Black*, or *Suffolk*, originated in England from a cross between the *Essex* and the *Neapolitan*. The *Large Black* is a new English breed. The *Lincolnshire Curly Coated* is a native of eastern England. A few have been brought to the United States.

Care and Treatment. Although hogs are raised to some extent in all parts of the United States, the great pork-producing section is in the Mississippi valley, where corn is abundant and cheap. The northern part of this valley is said to be the greatest hog-raising section in the world. The hogs are commonly pastured during the earlier stages of growth. Frequently a herd of swine are put with steers which are being fed whole corn, and the hogs feed upon the corn voided in the manure. Alfalfa pasturage is used for hogs in some sections. In the

South cowpeas, peanuts, chufas, and a variety of other crops are grown for hog pasture. Corn is the great hog feed of the Middle West; sometimes it is ground, but it is largely fed on the ear. As corn contains only a small percentage of ash, the hogs fed upon it exclusively become weak-boned and can hardly walk about. This is corrected by giving wood ashes, which they eat greedily. Skim milk and buttermilk from creameries constitute excellent food for pigs of all ages; and if corn meal is added, a pork of the finest quality is obtained. The large, over-fattened hog, weighing 400 or 500 pounds, has given way to a quickly maturing hog of from 200 to 300 pounds. This animal is produced more economically and is preferred by the packing houses. The gains in proportion to the food eaten diminish as the animal grows, and experiments have shown that it is most profitable to market the hogs when they have reached 200 or 250 pounds. Packers prefer a hog weighing about 250 pounds. See **PORK**; **SWINE**.

The number of hogs on farms in the United States increased from 1890 to 1911, when the total was 65,620,000, valued at \$615,170,000; but decreased in subsequent years, being in 1914 58,933,000 valued at \$612,950,000.

Bibliography. Wallace, *Farm Live Stock of Great Britain* (Edinburgh, 1889); J. Harris, *On the Pig* (New York, 1896); Spencer, *Pigs, Breeds and Management* (London, 1897); Cornevin, *Les porcs* (Paris, 1898); R. A. Craig, *Diseases of Swine* (New York, 1906); F. D. Coburn, *Swine in America* (ib., 1909); William Dietrich, *Swine, Breeding and Feeding* (Chicago, 1910); Dawson, *The Hog Book* (ib., 1911); Faelli, *Il porco* (Milan, 1911); Hoesch, *Die Schweinezucht* (Hanover, 1911); G. E. Day, *Productive Swine Husbandry* (Philadelphia, 1913).

HOG (so called as resembling in outline the back of a hog). This nautical term implies the opposite of *sag*. A ship is *hogged* when through weakness her ends droop in such a manner as to cause her keel to curve upward amidships. In lightly built or shallow vessels a tendency to hog is prevented by a truss frame arranged to support the ends and called the hog-frame. Most wood-built and many iron paddle-wheel river steamers have such frames rising well above the hull and sometimes above the deck houses. Instead of a framework extending from end to end, it may be located only amidships, and the strain transmitted to it by *hogchairs* extending to the ends. In deep-draft vessels, the side plating and fore-and-aft bulkheads act as girders to prevent hogging or sagging; the plating of the decks (especially of the upper deck) and bottom serves as ties to hold the framing in shape.

HOGAN, hō'gan. A cone-shaped earth-covered house used by the Navaho (q.v.).

HOGARTH, hō'garth, JOHN SHERIDAN (c.1815-c.61). A Canadian journalist and legislator. Born near Dublin, Ireland, in early youth he came to Toronto, Upper Canada. For a few years he practiced law in Hamilton. In 1841 he came into wide notoriety on account of his arrest at Rochester, N. Y., on a charge of having been concerned in the destruction of the *Caroline*, an American steamer that was set on fire and sent over Niagara Falls during the rebellion of 1837-38. He was set at liberty and returned to Hamilton. Later he established at Toronto the *United Empire*, a weekly news-

paper, and also became the parliamentary correspondent for several journals. About 1850 he contributed a number of vigorous articles on Canadian politics to *Blackwood's Magazine*. In 1855 his essay on *Canada and her Resources* was awarded the first prize of the Paris Exhibition Committee, and in 1857 he was elected a Liberal member of the Canada Legislative Assembly, and gave promise of a distinguished parliamentary career. While in Toronto in 1859, he suddenly disappeared, and it was not known until two years later, when his body was found, that he had been murdered.

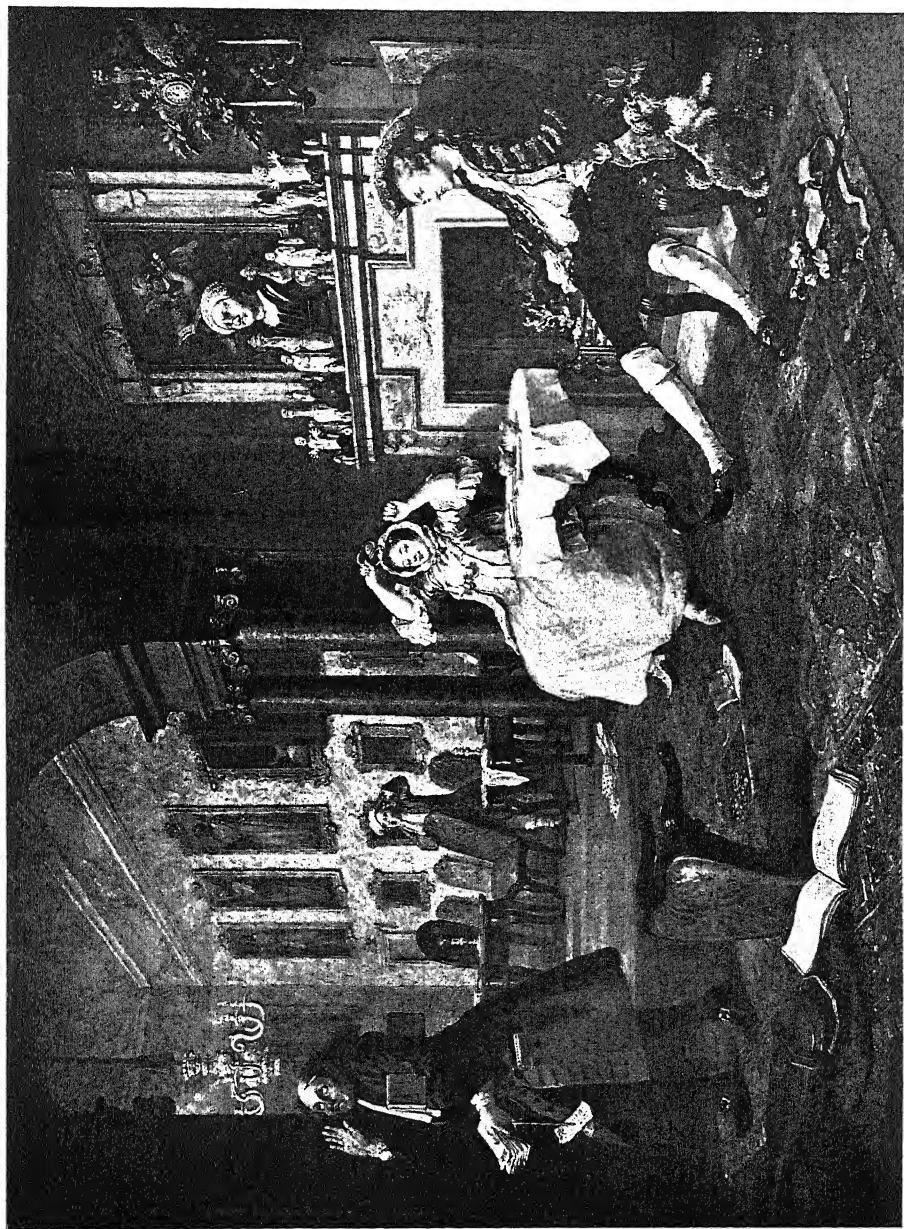
HOG APE. The mandrill. See **BABOON**.

HOG APPLE. See **PODOPHYLLUM**.

HOGARTH, hō'garth, DAVID GEORGE (1682-). An English archæologist, born at Barton-on-Humber. He was educated at Winchester and at Magdalen College, Oxford, and was tutor of Magdalen in 1886-93 and afterward fellow. He traveled in Asia Minor in 1887, 1890, 1891, and 1894, and carried on excavations at Paphos (1888), Dér-el-Bahari (1894), Alexandria (1895), Fayûm (1896), Naukratis (1899, 1903), Cnosus and the Dictæan Cave (1900), Zakro (1901), the Artemisium in Ephesus (1904-05), Assiut (1906-07), and Jerablus (1911)—largely for the British Museum. In 1897-1900 he was director of the British School at Athens, and in 1909 he became keeper of the Ashmolean Museum, Oxford. He wrote: *Devia Cypria* (1890); *A Wandering Scholar in the Levant* (1896); *Philip and Alexander of Macedon* (1897); *The Nearer East* (1902); *The Penetration of Arabia* (1904); *Excavations at Ephesus: The Archaic Artemisia* (1908), with others; *Ionian and the East* (1909); *Accidents of an Antiquary's Life* (1910).

HOGARTH, WILLIAM (1697-1764). An English painter and engraver. He was born in London, Nov. 10, 1697. His father was an unsuccessful schoolmaster, who was also a hack writer and corrector for the press. At the age of 17 Hogarth was apprenticed to a silversmith, for whom he made designs for plate which are now much prized by collectors. In 1718 he entered business on his own account, and, besides engraving arms and shop bills, he began to design copper plates for the booksellers. During the years 1721-26 he designed a number of engravings, the most important of which were "Masquerades and Operas" (1724), which struck the keynote of his future satire, and his illustrations to Butler's *Hudibras*, which brought him into public notice. At first Hogarth's ambition was to be a line engraver; but about 1724 he began to attend the private art school of Sir James Thornhill, in St. Martin's Lane, with a view to painting. In 1728-29 he painted a series of small conversation pieces, groups of family portraits connected by some common interest or occupation, besides others of a political and social character. Between 1727 and 1732 he engraved a large number of frontispieces for well-known books. In 1729 he ran away with his former master's daughter, Jane Thornhill, who made him an excellent wife.

Soon after his marriage he began the first of the series of paintings, "The Harlot's Progress," reproduced also as engravings, which made him famous. It represented in six plates the story of a country girl who came innocent to town to seek a situation. The original paintings, except one, are lost, but the plates are well known. The shameless piracy of these plates resulted in



WILLIAM HOGARTH
"AFTER THE MARRIAGE" (FROM "MARRIAGE À LA MODE")
FROM THE ORIGINAL IN THE NATIONAL GALLERY, LONDON

the Parliamentary Act of 1735 vesting in artists the exclusive rights to their designs. In the same year appeared "A Rake's Progress," eight plates, representing the career of a profligate young man of means, who ends in the madhouse, the original paintings for which are in the Soane Museum, London. The third and most famous series, the "Marriage à la Mode," was not completed till 1745. It represents in six plates the story of a fashionable marriage between the son of an impoverished lord and the daughter of a wealthy city alderman. The original paintings are in the National Gallery and are Hogarth's greatest work. Another prominent series was "Industry and Idleness" (12 sheets, 1747), executed as engravings only. They represent the respective careers of an idle and an industrious apprentice and were intended for the working class. Besides these he executed briefer series and many single plates.

Hogarth's art was essentially of a literary character, and he has well been called the Molière of painting. His constant endeavor was to point out the vices and follies of society with the strict moral purpose of reforming. His great importance in the development of art lies in the fact that he was the first to turn his back on traditional practices and to go directly to nature for the figures he painted. He is free from all foreign and ancient influence. In his portraits he is a technician of high order. His pictures are strongly and broadly painted and excel equally in drawing and in color. His paintings are better than his engravings, which are hastily executed and lack finish, although they are always spirited and intelligible.

He succeeded especially well in his portraits, one of the best of which is of himself with his dog Trump (1745), in the National Gallery. This collection contains also portraits of his sister, Mary Hogarth (1746), Lavinia Fenton as Polly Peachum, David Garrick as Richard III, the Earl of Feversham, and the inimitable "Shrimp Girl." The Metropolitan Museum, New York, possesses the portrait of Peg Woffington. Among his other paintings of a didactic character, painted for engraving, were "Southwark Fair" (1733), "Midnight Modern Conversation" (1734), the "Distressed Poet" (1735), the "Enraged Musician" (1741), "March to Finchley," and the "Election"—the two latter in the Soane Museum. He also attempted a few historical pictures on a large scale, but not with equal success.

Hogarth took a prominent part in the art controversies of his day, being the uncompromising foe of the imitation of the old masters—the "black masters" as he called them because of their darkened colors. In 1753 he published his *Analysis of Beauty* (reprinted at Pittsfield, Mass., 1909), setting forth his views on art; it was not a success and brought ridicule upon him. After the death of his father-in-law, in 1734, Hogarth converted his art school into a sort of life class, in which 30 or 40 artists drew after the nude. In 1757 he was appointed sergeant painter of all his Majesty's works, succeeding his brother-in-law, John Thornhill. His last days were marred by the ill success of his "Sigismunda Weeping over the Heart of her Husband," the harsh criticism of which was especially painful to Hogarth, as Sigismunda bore the features of his wife. An ill-advised effort in behalf of Lord Bute's ministry in 1762

brought down upon him the terrible satire of Wilkes and Churchill, until then his intimate friends. Though much grieved, Hogarth retaliated by two prints—a hideous portrait of Wilkes with a satyr's leer and squint, and "The Bruiser, C. Churchill." He died at London, Oct. 25, 1764.

Bibliography. Among the commentaries to Hogarth's engravings are: Trusler, *Hogarth Moralized* (London, 1768); Horace Walpole, *Anecdotes of Painting*, vol. iv (ib., 1771); Samuel Ireland, *Hogarth Illustrated* (ib., 1791-98) and *Graphic Illustrations of Hogarth* (ib., 1794-99); G. C. Lichtenberg, *Ausführliche Erklärung der Hogarth'schen Kupferstiche* (Göttingen, 1794); Nichols and Stevens, *Genuine Works of Hogarth* (London, 1808-17); Clerk, *Works of Hogarth* (ib., 1806). Hogarth's engravings are easily accessible in Hind's *Great Engravers Series* (ib., 1913). Among the numerous editions of his *Works* are those of Nichols (ib., 1820-22), of Monkhouse and Dobson (ib., 1872), and of Ireland and Nichols (ib., 1883). By far the best monograph on Hogarth is the folio by Austin Dobson (ib., 1902), with introduction by Sir Walter Armstrong, and admirable half-tone illustrations. Others are by Nichols (ib., 1785), G. A. H. Sala (ib., 1866), and Austin Dobson (New York, 1908); Benoit, in *Les grands artistes* (Paris, n.d.); Meier-Gräfe (Munich, 1910); Edward Garnett (New York, 1910); C. L. Hind (ib., 1910); and the excellent brief folios by Hutton in *Kunst der Gegenwart* (Berlin, 1908).

HOG CHOLERA, SWINE FEVER, or SCHWEI-NEPEST. An acute, subacute, or chronic contagious disease of hogs, caused primarily by a filterable virus and accompanied by a very high death rate. In the course of the disease inflammatory and necrotic processes develop, produced either by *Bacillus suispestifer* when the lesions occur in the intestinal canal and in the abdominal lymph glands, or by the *Bacillus suissepticus* when the lesions are manifested in the lungs. The term has been used to cover at least two diseases—true hog cholera and swine plague (q.v.).

The chief symptoms of hog cholera are a rise in body temperature, loss of appetite, a discharge from the eyes, watery at first but later yellowish and viscid, a purplish coloration of the skin, giving rise to a common name, blue sickness, occurring especially on the ears, chest, and abdomen, the underside of the neck, and on the inside of the thighs. Constipation is an early symptom, but diarrhoea soon sets in and persists until the death of the animal. The excrement is dark-colored and possesses a fetid odor. The body temperature may rise from one to three degrees above the normal, but the elevation of temperature is frequently absent. The animals are dull and indifferent to surroundings, lie down a great part of the time, and hide their heads under straw or litter, often have a dry cough, and sometimes squeal from intestinal pain. As the disease progresses, they become gaunt with arching backs. Acute cases may last from two to five days; chronic ones, a month. The characteristic pathological changes are enlargement of the spleen and a hemorrhagic condition of the large intestines and lymphatic glands. In chronic cases ulcers are formed in the large intestines, or the whole wall may become effused with blood.

Hog cholera and swine plague (*Schweine-seuche*) have been frequently confounded, but

in typical cases they may be distinguished by clinical symptoms and post-mortem lesions. In most outbreaks of contagious hog diseases, hog cholera and swine plague occur in combination in the same animal. In general, however, the seat of infection in hog cholera is in the intestines; that of swine plague is in the lungs and secondarily in the intestines. A reddening of the skin is an indication of hog cholera, while coughing is more pronounced in cases of swine plague. For a reliable differential diagnosis of the two diseases it is necessary to make pure cultures of the microorganisms that are concerned.

No satisfactory medicinal treatment has been devised for hog cholera. Recognized tonics which assist in keeping hogs in good physical condition may render them less susceptible to disease. A mixture containing sodium salts, sulphur, sulphide of antimony, and wood charcoal has proved as effective as any remedy.

The investigations carried on by agents of the United States Department of Agriculture which led to the discovery that this disease is caused primarily by a filterable virus were followed by experiments which have resulted in the production of an immune serum that is being successfully used in immunizing hogs against the disease. This immune serum is produced by the repeated injection of blood from a hog sick of hog cholera into vigorous immune hogs. Two methods of immunizing hogs against the disease are now practiced. The first, which confers a passive immunity, consists in the injection of the immune serum into the hog. While protecting against the disease for but a few weeks, it gives the grower sufficient time to fatten and market his drove after the disease appears. The second, known as the serum simultaneous method, which confers an active immunity, consists in the injection of the immune serum on one side of the body and a small amount of blood taken from a hog sick of hog cholera on the other side. This simultaneous method confers upon the injected pig a permanent and lasting immunity.

It has been found practically impossible to disinfect hog pens and yards after an outbreak of hog cholera. Infected pens should be burned, and the surrounding ground should be cultivated to some crop for at least a year before again using as a hog yard. Pens should be kept as clean as possible and treated from time to time with lime and whitewash. By observing these precautions, preventing infection of the water supply, and quarantining imported hogs before allowing them to run with the herd, the liability to infection from hog cholera will be much reduced. Consult Hutyra and Marek, *Special Pathology and Therapeutics of the Diseases of Domestic Animals*, vol. i (Chicago, 1912), and publications of the United States Bureau of Animal Industry and of the Department of Agriculture.

HOG DEER. The "para," or smallest of the East Indian rusine deer (*Cervus porcinus*), which takes its name from its habit of darting through the tall grass like a startled boar. It stands only 2 feet high at the withers. Its legs are comparatively short, and its antlers, having given off a brow tine, are nearly straight to the small terminal fork and are mounted upon remarkably high pedicels. The general color is rufous brown, paler in summer and somewhat spotted. This deer ranges through northern

India and down the coasts of Assam and Burma. It is very numerous, not gregarious, and forms a favorite object of jungle sport, sometimes by spearing.

HOGGE, hōg, MOSES DRURY (1819-99). An American Presbyterian minister. He was born in Hampden-Sidney, Va., was educated there, and was made assistant in a Richmond church in 1844. When a second Presbyterian church grew out of the first, Dr. Hoge became its pastor (1845-85), and during the Civil War he succeeded in securing from the British and Foreign Bible Society a very large number of volumes for the use of Confederate soldiers. He was joint editor of the *Central Presbyterian* (1862-67). A volume entitled *Perfection of Beauty and Other Sermons* was published in 1904.

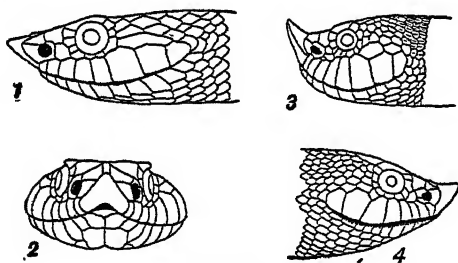
HOG'FISH', or Hog'MOL'LY. A local name for the log perch (q.v.).

HOGG, hōg, JAMES (1770-1835). A Scottish poet, known as the Ettrick Shepherd, born in the parish of Ettrick, Selkirkshire, in 1770. His father was a poor farmer. The boy's education was slight, for he was taken from school to herd ewes. But from his mother he learned many folk tales of giants, fairies, and brownies. Beginning to make songs for lasses to sing in chorus, he next wrote them out with great labor. His first poem was published anonymously in 1800. Going to Edinburgh, in 1801, to sell his employer's sheep, he wrote out from memory a collection of his songs and published them roughly as *Scottish Pastorals, Poems, Songs, etc.* The next year he made the acquaintance of Scott, who was visiting the Ettrick Forest in search of material for the *Minstrelsy of the Scottish Border*. Several ballads which Hogg and his mother furnished Scott appeared in the third volume of the *Minstrelsy* (1803). In 1807 Hogg published *The Mountain Bard*, original ballads suggested by Scott. With the proceeds of this volume and a treatise on sheep, amounting to £300, Hogg took a farm, which proved a disastrous venture. In 1810 he went to Edinburgh and began as professional author with the *Forest Minstrel*, published in the last-named year. Three years later appeared his most imaginative poem, *The Queen's Wake*. By this time he was becoming acquainted, directly or through correspondence, with some of the most eminent men of letters, who admired him greatly. He married in 1820 and retired to the farm of Eltrive Lake in the valley of the Yarrow. In 1834 appeared his *Domestic Manners and Private Life of Sir Walter Scott*. He died Nov. 21, 1835, and was buried in the Ettrick churchyard. In 1860 a monument was erected to his memory, overlooking St. Mary's Lake. Hogg was immortalized as the Ettrick Shepherd by Wilson in the *Noctes Ambrosianæ*. Among his poems not cited above are *The Pilgrims of the Sun* (1815), *The Poetic Mirror* (1816), and *Songs* (1829). These and other poems place Hogg among the greatest of the peasant poets of Scotland. Well known are such songs as "When the Kye Comes Hame" and "Flora Macdonald's Farewell." Hogg also wrote many tales of uneven quality. The most remarkable is entitled *Confessions of a Fanatic* (1824). Interesting, too, is the volume called *Winter Evening Tales* (1820), depicting the manners of the border. Consult: *Works*, edited with memoirs by T. Thomson (London, 1865); "Poems," selected, in *Canterbury Poets* (ib., 1886); *Me-*

morials of J. Hogg, by his daughter, Mrs. Garden (ib., 1887).

HOGG, THOMAS JEFFERSON (1792-1862). An English biographer. He was born at Norton, Durham. In 1811 he was expelled from University College, Oxford, with Shelley for suspected complicity in bringing out *The Necessity for Atheism*. He became a conveyancer at York, studied law, was admitted to the bar in 1817, and became a revising barrister in 1833. He resumed his intimate relations with Shelley in 1814, published his reminiscences of the poet in 1832 in the *New Monthly Magazine*, and in 1844 received a £2000 bequest under Shelley's will. Supplied with the documents, he began in 1855 to write Shelley's biography, of which he produced the first two volumes in 1858 (re-published in 1906). The work was so unsatisfactory that members of Shelley's family obliged Hogg to discontinue the task he had started. Consult Richard Garnett, in *Dictionary of National Biography*, vol. xxvii (London, 1891).

HOG-NOSE. A harmless American serpent, remarkable for its blunt snout and curious manners. Three species form the colubrine genus *Heterodon*, all confined to North America, exclusive of the Pacific coast and Mexico. The best-known species (*Heterodon platyrhinus*) is one of our most common and widespread snakes. It is usually about 2, but may be 3, feet long and is normally reddish brown above, heavily blotched or obscurely barred with a darker tint, and underneath is greenish white. Great variety in color and markings exists, however, and many seem sooty black or dark slate all over. It is



HEADS OF HOG-NOSE SNAKES.

1, *Heterodon platyrhinus*. 2, face of same. 3, *Heterodon nasicus*. 4, *Heterodon simus*.

always to be recognized by its piglike snout and its extraordinary behavior when disturbed. It is timid, and will hide or escape when possible; but if surprised or cornered it will throw itself into vigorous contortions and perhaps soon tumble over on its back as if dead, or, more probably, it will inflate its long lung until its body swells up like a sausage, and at the same time extend its anterior ribs until its neck is surprisingly broad and flat, and then, opening wide its great mouth, will blow and hiss loudly. This alarming menace is meant to terrify its foes and has led to the popular names of "blowing viper," "spreading adder," etc., and to the general belief that it must be very poisonous. Its blotched back, easily mistaken by the unobserving for that of a copperhead, adds to its evil reputation. Nevertheless, this snake is entirely harmless, and when handled is found to be so gentle that it can hardly be forced to bite.

It feeds on mice, frogs, insects, birds' eggs, and so on, all obtained on the ground, for it is

unable to climb trees. It lays a number of eggs, about an inch in length, in loose soil, into which it burrows for this purpose. The eggs are covered with a tough parchment-like coat and probably hatch in a few days. There seems to be no precise time of laying; young have been reported from May until September. The young just issued from the egg will go through their contortions and hissing when molested, as do the adults. Much interesting information as to their breeding and other habits, collected by Abbott, Hay, and others, will be found summarized in Cope, *Crocodilians, Lizards, and Snakes*, published by the Smithsonian Institution (Washington, 1900).

The Southern States have a second species (*Heterodon simus*), and Texas and the Mexican border a third (*Heterodon nasicus*), in which the point of the snout is longer and more up-turned than in the Northern forms. See Plate of SNAKES, AMERICAN HARMLESS.

HOG PLUM, SPANISH PLUM, and BRAZILIAN PLUM. Names given in the West Indies and other tropical countries to the fruit of certain species of *Spondias*, a genus which belongs to the family Anacardiaceae. The species are trees and shrubs, with pinnate leaves, with terminal leaflets, and flowers in racemes or panicles. Some of them produce very pleasant fruits, among which may be mentioned *Spondias purpurea* and *Spondias lutea*, which are generally called hog plum in the West Indies, because the fruits are a common food of hogs. *Spondias purpurea* has fruit about an inch in length, ovate or oblong, purple or variegated with yellow; yellow pulp with a peculiar but agreeable acid and aromatic taste. The fruit of *Spondias tuberosa*, called imbuzeiro in the north of Brazil, is about twice the size of a large gooseberry, oblong, yellowish, with a leathery skin and sweetish-acid pulp. The tree is remarkable for the numerous round black swellings, about 18 inches in diameter, which it produces on its widely spreading roots, and which are very cellular and full of water. They are evidently intended for the wants of the tree in the dry season and are often dug out by travelers for the sake of the water, of which each full-grown knot yields about a pint. An important species is the ti or Tahiti apple (*Spondias dulcis*), a very fine fruit of the South Sea Islands. This tree often attains a height of 50 to 60 feet and, according to Seeman, is laden with fruits averaging a pound each.

HOG RAT. See HUTIA.

HOGS-HEAD. An old English measure of capacity. For wine, it was equivalent to 63 gallons or 52½ imperial gallons; for ale, 48 gallons; and for beer, 54 gallons. In the United States it is still used as a measure for liquids, equivalent to two barrels, or 63 gallons, each of 231 cubic inches. Section 3339 Revised Statutes, in referring to standard barrels of fermented liquids, says, "more than one barrel, and not more than sixty-three gallons, shall be accounted two barrels, or a hogshead." When used for tobacco, the hogshead varies by custom rather than by statute, in different States ranging from about 750 to 1200 pounds; it is usual, however, to mark the actual net weight of the contents on the hogshead.

HOGUE, ♂g, or **HOUGUE**, ♂og, LA. A roadstead near the northeast extremity of the peninsula of Cotentin, Normandy, a few miles south of Barfleur. It gives its name to the naval

battle of May 29 (old style May 19), 1692, when the combined English and Dutch fleets, under Admiral Russell, defeated the French fleet commanded by Tourville. The name of La Hogue is often confounded with La Hague, the name of the cape at the northwest extremity of Cotentin.

HOH. See QUILLAYUTE.

HOHENBERG, hō'en-bĕrk, SOPHIE, DUCHESS OF (1868-1914). The morganatic wife of Francis Ferdinand, Archduke of Austria (q.v.), with whom she was assassinated at Serajevo, Bosnia, in June, 1914. She was born at Stuttgart, Württemberg, and before her marriage to the Archduke in 1900 was known as the Countess Chotek. She was the mother of Princess Sophie (born 1901), and of Princes Maximilien Charles (born 1902) and Ernest (born 1904); but her children were excluded from succession to the Austro-Hungarian throne by the laws of the Empire.

HOHENHEIM, hō'en-hīm, PHILIPPUS, A. P. VON. See PARACELSUS.

HOHENLINDEN, hō'en-lin'den (Ger. tall lindens). A village in Upper Bavaria, 19 miles east of Munich, celebrated for the victory gained there by the French, under Moreau, over the Austrians under Archduke John, Dec. 3, 1800. Moreau's army was posted on the plateau between the Isar and the Inn and barred the way to Munich, which was the Archduke's objective point. In three columns the Austrians advanced to the attack through forest and ravines in a blinding snowstorm. Moreau contented himself with holding them in check until Richepanse, whom he had sent around the enemy's flank, reached the Austrian rear. Then he hurled Ney against their front. Richepanse delivered his attack from the rear, and the Austrian army was destroyed between the two French forces. The Austrians lost 20,000 men (including 10,000 prisoners) and 100 guns, while Moreau's loss amounted to only 5000. The battle hastened the conclusion of peace at Lunéville, Feb. 9, 1801.

HOHENLOHE, hō'en-lō'e. Formerly an earldom, later a principality, in Franconia, Germany. It lost its sovereignty and was divided in 1806, the main portion being assigned to Württemberg and a part to Bavaria.

HOHENLOHE. A princely family of Germany, claiming descent from Eberhard, one of the early dukes of Franconia. The family first appears in history in the early part of the twelfth century in possession of the castle of Holloch, near Uffenheim. The first Count we hear of is Heinrich, who lived in the twelfth century. He left two sons, Konrad and Gottfried, who followed the fortunes of the Hohenstaufen and founded respectively the lines of Hohenlohe-Brauneck and Hohenlohe-Holloch. The former became subdivided into the Haltenbergstetten and Brauneck branches, both of which were extinct in 1390; the latter into the Weikersheim and Uffenheim, or Speckfeld, branches, of which the latter became extinct in 1412. In 1551 a new division in the Weikersheim line gave rise to the branches of Hohenlohe-Neuenstein and Hohenlohe-Waldenburg, which still continue. In the Reformation the Neuenstein branch became Protestant, while the Waldenburg counts remained Catholic. Princely rank was conferred upon the latter branch in 1744 and on the former in 1764. Of the Neuenstein branch, there were two lines—

Oehringen, extinct in 1805 (see *MEDIATE*), and Langenburg, the latter being further subdivided into the Hohenlohe-Ingelfingen (Oehringen after 1805) and Hohenlohe-Kirchberg (extinct in 1861). The Waldenburg branch formed two lines—Bartenstein, with the cadet branch of Jagstberg, and Schillingsfürst, to which was added the Duchy of Ratibor. Among the prominent members of the Hohenlohe family are:

FRIEDRICH LUDWIG, PRINCE OF HOHENLOHE-INGELFINGEN (1746-1818). A Prussian general. He distinguished himself at the storming of Weissenburg (1793) and won the battle of Kaiserslautern (Sept. 20, 1794). After the defeat of Jena, in which he shared, he succeeded the Duke of Brunswick in command and capitulated at Prenzlau with 17,000 men (Oct. 28, 1806). For this he was severely censured and forced to retire from further participation in the campaign.—**KRAFT KARL AUGUST EDUARD FRIEDRICH, PRINCE OF HOHENLOHE-INGELFINGEN** (1827-92). A Prussian general of artillery. He received a thorough training for the artillery service and was placed in several positions of responsibility. He served with distinction through the Crimean War. In 1866 he held an important command at Sadowa, and in 1870 he commanded the artillery of the Guards in all its engagements, including Saint-Privat and Sedan. He was chief of artillery at the siege of Paris. He was made a lieutenant general in 1873, adjutant general in 1875, general of infantry in 1883, and general of artillery in 1889. He died in Dresden, Jan. 16, 1892. He was the author of several works on military science: *Militärische Briefe* (1887-90); *Strategische Briefe* (1887); *Die Feldartillerie in ihrer Unterstellung unter die Generalkommandos* (1889); *Ideen über Befestigungen* (1888); also, *Gespräche über Reiterei* (1887).—**CHLODWIG KARL VICTOR, PRINCE OF HOHENLOHE-SCHILLINGSFÜRST, DUKE OF RATIBOR AND KORVEI** (1819-1901). Chancellor of the German Empire from 1894 to 1900. He was born March 31, 1819, at Rotenburg-an-der-Fulda. His mother was a princess of Hohenlohe-Langenburg. He studied political science and jurisprudence at Heidelberg, Göttingen, and Bonn. Before he came to his title of Duke of Ratibor and of Korvei, in 1845, he held offices in connection with the law courts at Ehrenbreitstein and Potsdam. In the Bavarian Diet he opposed the Ultramontane policy, and in 1866 he strove to bring over Bavaria to the side of Prussia. At the close of the year he became Bavarian Minister of Foreign Affairs and President of the Ministerial Council, holding office till March, 1870. It is now that his importance in history begins. His efforts in behalf of a united Germany long met with fierce opposition, but he saw clearly the triumph of the cause for which he had worked, and entered the First German Reichstag as a member of the *Reichspartei*. In 1874 he was appointed German Ambassador to Paris, and in 1878 he was the third German Plenipotentiary at the Congress of Berlin. In 1885 he became Governor of Alsace-Lorraine, in which position he displayed conspicuous tact. On the resignation of Count Caprivi, in 1894, Prince Hohenlohe was created Imperial Chancellor. This office he resigned in 1900, being succeeded by Count von Bülow. During his long career in German politics Prince Hohenlohe did much to promote German unity. He had to face the hostility of the anti-Unionists in Bavaria and was one of Bismarck's chief

supporters in that statesman's Imperial policy. As Chancellor, he promoted the colonial policy and favored the creation of a powerful navy. He was a favorite with William II up to the time of his resignation, in October, 1900. It was said that the cause of his resigning the chancellorship was dissatisfaction with the Emperor's aggressive policy, especially in so far as it related to China. He died at Ragatz, Switzerland, July 6, 1901. Consult his *Denkwürdigkeiten* (Stuttgart, 1906; Eng. trans., New York, 1906), which caused an international sensation on their appearance. They supersede all his biographies.—GUSTAV ADOLF (1823-96), PRINCE OF HOHENLOHE-SCHILLINGSFÜRST. A brother of the Chancellor. He took holy orders in 1849 and became in 1857 Bishop of Edessa in partibus and almoner to Pius IX. He was made Cardinal in 1866, and endeavored to prevent the Kulturkampf (q.v.). He was sent to Rome in 1872 as Ambassador to the Holy See, but his appointment was rejected by Pius IX. He returned to Rome in 1876 and subsequently gained the favor of Leo XIII. From 1879 to 1884 he was Bishop of Albano and became subsequently archpriest of Santa Maria Maggiore in Rome. He died in Rome, Oct. 30, 1896.—HERMANN, PRINCE OF HOHENLOHE-LANGENBURG (1832-1913). He entered the Württemberg army, was in the Austrian service from 1854 to 1860, and was a general in the army of Baden from 1862 to 1871. After 1860 he was a member of the Upper Chamber of Württemberg, but was represented by his son after 1895; Vice President in 1893. He was a member of the Imperial Reichstag from 1871 to 1880 and acted with the *Reichspartei*. (See POLITICAL PARTIES, Germany.) From 1894 to 1907 he was Governor of Alsace-Lorraine. He was the founder and president (1887-94) of the Deutsche Kolonialgesellschaft. He held the military rank of general of cavalry in the Prussian army.—ERNST, PRINCE OF HOHENLOHE-LANGENBURG (1863-), son of the preceding, was born at Langenburg and studied at the universities of Bonn, Tübingen, and Leipzig. In 1889 he entered the army as a lieutenant colonel. From 1900 to 1905 he was Regent of Saxe-Coburg-Gotha. He was a member of the Upper Chamber of Württemberg after 1895 and of the German Reichstag (1907-11; second Vice President, 1909-10).

HOHENSTAUFEN, hō'en-stou'fen. A princely house of Swabia in Germany, which held possession of the German Imperial throne from 1138 to 1254, except for a few years in the early thirteenth century. The family traced its descent from Frederick of Biren, who lived in the second half of the eleventh century, and whose son, Frederick of Staufeu, built the castle from which the family derived its name, some vestiges of which are still to be seen on the summit of the Hohenstaufen, close to the town of Göppingen, Württemberg. The son, Frederick of Staufeu, was a faithful partisan of the Emperor Henry IV and in return received Henry's daughter and the Duchy of Swabia in 1079. Duke Frederick, at his death in 1105, left two sons—Frederick II the One-Eyed and Conrad; the former was immediately confirmed in the possession of Swabia by Henry V, and in 1112 the latter received the Duchy of Franconia. Upon the death of Henry V in 1125 his family estates fell to the house of Hohenstaufen. It seemed, too, as if the Imperial dignity would be conferred upon Frederick on account of his

talents and popularity; but Lothair of Saxony, his rival and enemy, was elected as Henry V's successor. On Lothair's accession he demanded the Imperial possessions held by the house of Hohenstaufen, and a war ensued between him and the Hohenstaufen princes, in which Lothair was supported by the house of Welf (Guelph). In the course of this struggle Conrad was crowned King of Italy in 1128; but the two brothers were forced to make peace with Lothair in 1135 and afterward lent him their support. After Lothair's death Conrad was elected King of Germany, in 1138, as Conrad III (q.v.). Under Conrad III the house of Hohenstaufen waged war against the house of Guelph, which for a brief time was weakened by the loss of Bavaria.

On Conrad's death, in 1152, his nephew, Frederick I Barbarossa, became Emperor. As he was the offspring of a Hohenstaufen father and a Guelph mother, it was hoped that the struggle between the two houses might be ended by his accession. But the defiant attitude of Henry the Lion, Duke of Saxony and Bavaria, the powerful representative of the Guelph family, caused the conflict to break out afresh in 1180. Henry the Lion was conquered and deprived of most of his possessions. Frederick went on the Third Crusade, but died in 1190, before reaching Jerusalem. His son, Henry VI, succeeded to the throne without opposition. By a marriage with the heiress of Sicily and by conquest he added southern Italy and Sicily to the Empire. He exercised the most far-reaching power of all the Hohenstaufens and dreamed of a world-wide empire. Richard the Lion-Hearted of England was obliged to become his vassal in order to be freed from captivity. Some of the Christian rulers in the East had sought protection from Henry, and he sent an army to the Holy Land, "the German Crusade" (see CRUSADE) to establish his own supremacy. His plans were frustrated by his early death, in 1197. His son, Frederick II, had already been crowned King of Germany, but as he was only a child of three his rights were passed over. The Guelphs chose Otho of Brunswick, son of Henry the Lion, and the choice of the partisans of the Hohenstaufen fell upon Philip of Swabia, uncle of Frederick II. Civil war followed, the contest terminating with the assassination of Philip in 1208 by Otho of Wittelsbach. For a time Otho of Brunswick (Otho IV) was recognized as ruler; then his opponents rallied about Frederick II, who in the meantime had been ruling his Kingdom of Sicily, which he had inherited from his mother. Frederick was crowned and by 1215 was recognized by all except a few obstinate partisans of Otho IV. He ruled over Germany, Italy, and Sicily, and also became King of Jerusalem. His reign was spent to a great extent in a struggle with the papacy. The partisans of the Hohenstaufen in Italy and the opponents of the Imperial power, in general the supporters of the papacy, were known respectively as Ghibellines and Guelphs. (See GUELPHS AND GHIPELLINES.) After Frederick's death, in 1250, the inveterate animosity of the Guelphs followed his son, Conrad IV, who abandoned Germany for his hereditary Italian possessions and died in 1254. After Conrad's death his half brother, Manfred, fought for the Hohenstaufen interests until he was defeated and killed at the battle of Benevento, in 1266, against Charles of Anjou, who at the invitation of the Pope had undertaken

the conquest of the Two Sicilies. Manfred's sons were kept in prison until his death. His daughter married Peter III of Aragon, who later avenged the destruction of the Hohenstaufen by expelling their foes from the Kingdom of Sicily. Conrad's young son, Conradin, in an attempt to reconquer the Two Sicilies, was taken captive by Charles of Anjou at the battle of Tagliacozzo and executed at Naples on Oct. 29, 1268. Enzo, an illegitimate son of Frederick II, who had been made King of Sardinia, died in prison four years later. Thus all of the male descendants of Frederick II perished. The emperors of this family rank among the ablest rulers of Germany and hold the first place in popular German tradition to-day, just as they held the first place in the affections of the people during their lifetime. They appear in general as men possessed of great virtues and of great faults and impressive by reason of both. Frederick Barbarossa, according to the legend, which was originally told of Frederick II, is not dead, but asleep, and will wake to help his people in time of need. Frederick II is one of the most remarkable figures of the Middle Ages in his character as ruler, knight, scholar, and freethinker. Consult Friedrich von Raumer, *Geschichte der Hohenstaufen* (5th ed., 6 vols., Leipzig, 1878), and Jastrow and Winter, *Deutsche Geschichte im Zeitalter der Hohenstaufen* (2 vols., Berlin, 1893-1901). See also articles on the individual emperors.

HOHENSTEIN, hō'en-shtin, COUNT. See THUN UND HOHENSTEIN.

HOHENSTEIN-ERNSTTHAL, ernst'täl. A manufacturing town in the Kingdom of Saxony, 12 miles northeast of Zwickau. It produces chiefly textiles and knit goods, gloves, machinery; in the neighborhood are mines of sulphur, copper, arsenic, and gold. Hohenstein and Ernstthal, formerly two cities, were incorporated together in 1898. Pop., 1900, 13,397; 1910, 15,776.

HOHENWART, hō'en-värt, KARL, COUNT (1824-99). An Austrian statesman, leader of the Federalist party. In 1868 he became Governor of Upper Austria and three years afterward succeeded Potocki as President of the Ministry. In his cabinet he held the portfolio of the Interior. His Federalist policy met with such opposition on the part of the Hungarian Ministry and the German Liberals that he was forced to resign after holding office for less than a month. He was elected to the Lower House in 1873 and became a leader of the Right Centre, which had a coalition majority under Taaffe's ministry (1879-91). In 1885 Hohenwart was appointed president of the Supreme Court of Accounts, and in 1891 he formed the Hohenwart Club, a strongly conservative body consisting of German Conservatives, Slovenes, Croats, and Rumanians, as well as the great landed proprietors of Bohemia. But this party broke in 1896, through the defection of the German members, and in 1897, on the appointment of its leader to the Upper House, it disintegrated entirely.

HOHENZOLLERN, hō'en-tsōl'ern. A province of Prussia, consisting of a narrow strip of land entirely surrounded by Württemberg and Baden, and covering, together with its nine exclaves, an area of about 440 square miles (Map: Germany, C 4). Previous to 1850 it was divided into two parts, Hohenzollern-Sigmaringen and Hohenzollern-Hechingen, but they were united to form the Government of Sigmaringen. It

extends from the Neckar in the northwest to the vicinity of Lake Constance and is divided by the Rauhe Alb, which rises in places to 3000 feet. The Danube crosses the province in the south, the Neckar in the north. The mountain valleys are productive and yield grain, fruit, hops, etc. The Alb chain yields some iron, gypsum, coal, and peat, and in other mountains some deposits of rock salt are found. Mineral springs abound. Some manufacturing is done in the way of cotton spinning and the production of iron; but the chief industries are agriculture and cattle raising. Since 1873 it has had a Landtag sitting at Sigmaringen. It sends one deputy to the Reichstag. Pop., 1900, 66,783; 1910, 71,011. The inhabitants are nearly all Roman Catholics, and the province forms a dependency of the Archbishop of Freiburg. On a steep eminence near Hechingen stands the magnificent castle of Hohenzollern, erected in the second half of the nineteenth century, in the style of the fourteenth century, on the ruins of the mediæval stronghold, the cradle of the reigning Hohenzollern dynasty of Prussia.

HOHENZOLLERN. The family name of the royal house of Prussia, in which has been vested also, since Jan. 18, 1871, the dignity of German Emperor. The name is derived from the ancestral Castle Zollern, or Hohenzollern, in Swabia. The origin of the house is involved in obscurity, and the story of its descent from Count Thasilo, a Swabian noble of the time of Charles the Great, is a fiction of the sixteenth century. The family name occurs as early as the eleventh century in the persons of Burchard and Wezel of Zolorin, who were killed in 1061; but whether there is any relationship between these and the succeeding Hohenzollern family is a matter of doubt. The house of Hohenzollern occupied a prominent position among the petty princely families of Swabia as early as the first half of the twelfth century, and at the close of that century (1192) we find Count Frederick of Zolorin invested with the Burgraviate of Nuremberg, an Imperial office, which descended to his posterity. His sons, Frederick and Conrad, divided the possessions of the house in 1227, founding the Swabian and Franconian lines respectively. From the close of the sixteenth century the elder, or Swabian, branch of the house of Hohenzollern existed in the two lines of Hohenzollern-Hechingen and Hohenzollern-Sigmaringen. In 1695 a pact of inheritance was made between these branches and that of Brandenburg (see below). In 1821 a new covenant was drawn up and confirmed by the King of Prussia, as head of the Hohenzollern family, by which it was provided that in case of failure of male issue in either line possession should pass to the other and on the extinction of both lines should vest in the royal family of Prussia. But before the prospect of extinction presented itself the princes of Hohenzollern-Hechingen and Hohenzollern-Sigmaringen, after the commotions of the revolutionary year 1848, decided to abdicate in favor of the King of Prussia. The act of renunciation took place at the close of 1849, and Frederick William IV took possession of the two principalities in the following year, the two princes being given annual pensions. Leopold of Hohenzollern, the prince who was offered the crown of Spain in 1870, an offer which was the immediate cause of the Franco-Prussian War, was the eldest son of the last ruler of Hohenzollern-Sigmaringen. The second son, Charles,

became Prince and King of Rumania, and died in 1914.

The great destiny of the family was reserved for the cadet branch, the Franconian line. They attached themselves to the Hohenstaufen until that great house became extinct, when they gave their support to Rudolph of Hapsburg. During the civil war which followed the double election of 1314 they sided with Louis of Bavaria against the house of Austria, but subsequently they became once more faithful supporters of the Hapsburgs. Acquisitiveness and a capacity to hold what was once obtained and to administer it with thrift seem to have characterized to a greater or less degree all the Franconian Hohenzollern princes. From the founder of the line, Conrad III (died 1261), there was a steady gain in territory and influence under Frederick III (1261-97), Frederick IV (1297-1332), John II (1332-57), and Frederick V (1357-98). The possessions of the house, in which was vested the Burgaviate of Nuremberg, were constituted into the two margraviates of Bayreuth (originally Culmbach) and Anspach. The sons of Frederick V, John III and Frederick VI, possessed respectively Bayreuth and Anspach, the latter inheriting his brother's possessions in 1420. Frederick VI in 1411 received the Margraviate of Brandenburg as a pledge for a loan to the Emperor Sigismund, and in 1415 it was granted to him as an hereditary possession, together with the dignity of Elector. This was the foundation of the real greatness of the house of Hohenzollern.

The Elector Albert Achilles of Brandenburg by the so-called *Dispositio Achillea* of 1473 decreed that the Franconian margraviates (Anspach and Bayreuth) should be separated from Brandenburg and ruled as secundogenitures. The last Margrave of Bayreuth died in 1769, when the state was united with Anspach. In 1791 the Margrave of Anspach and Bayreuth sold his principalities to Prussia, which, however, retained them only a few years.

The electors of Brandenburg were as follows:

Frederick I (the Frederick VI mentioned above)	(1415-1440)
Frederick II.....	(1440-1470)
Albert Achilles.....	(1470-1486)
John Cicero.....	(1486-1499)
Joachim I Nestor.....	(1499-1535)
Joachim II Hector.....	(1535-1571)
John George.....	(1571-1598)
Joachim Frederick.....	(1598-1608)
John Sigismund.....	(1608-1619)
George William.....	(1619-1640)
Frederick William, the Great Elector.....	(1640-1688)
Frederick III.....	(1688-1713), after 1701, King Frederick I of Prussia

The Hohenzollern kings of Prussia since Frederick I have been as follows:

Frederick William I.....	(1713-1740)
Frederick II the Great.....	(1740-1786)
Frederick William II.....	(1786-1797)
Frederick William III.....	(1797-1840)
Frederick William IV.....	(1840-1881)
William I.....	(1861-1888), after 1871, German Emperor
Frederick III.....	(1888)
William II.....	(1888-)

The history of the Hohenzollern family from the fifteenth century is that of BRANDENBURG, PRUSSIA, and GERMANY. Consult: Stillfried-Alcantara and Kugler, *Die Hohenzollern und das deutsche Vaterland* (Munich, 1881), a well-ordered account, dedicated to Emperor William I and presumably having a semiofficial standing; Albert Waddington, *L'Acquisition de la couronne royale de Prusse par les Hohenzollern*

(Paris, 1888), a valuable study of Hohenzollern history in the seventeenth and eighteenth centuries, with many documents; Paul Seidel, *Hohenzollern-Jahrbuch, Forschungen zur Geschichte der Hohenzollern in Brandenburg-Preussen* (Leipzig, 1897-1914); Linau, *Hohenzollern* (Berlin, 1905); Herbert Tuttle, *History of Prussia* (4 vols., Boston, 1884-96), one of the best products of American historical scholarship, cut short at 1757 by the death of the author.

HOHLFELD, hōl'fēld, ALEXANDER RUDOLF (1865-). An American Germanic scholar, born at Dresden, Germany. He received his Ph.D. from the University of Leipzig in 1888 and studied at Paris in 1889. At Vanderbilt University he was instructor in French (1889-90), adjunct professor of Romance languages (1890-92), professor of Germanic languages (1892-1901), and dean of the academic department (1900-01). In 1901 he became professor of German at the University of Wisconsin, and in 1913 he was president of the Modern Language Association of America. He is author of *Die altenglischen Mysterienspiele* (1888) and *The Teaching of the History of a Foreign Literature* (1905), was editor in chief of a *Deutsches Liederbuch für amerikanische Studenten* (1906), and contributed to American and German periodicals.

HÖHNEL, hē'nel, LUDWIG VON (1857-). An Austrian explorer, born at Pressburg and educated at the Naval Academy of Fiume. In 1886 he accompanied Count Teleki in the journey from Zanzibar, on which Lakes Rudolph and Stephanie were discovered, and a large area, before unknown, carefully plotted on Höhnel's maps. The expeditions proved the connection between the Abyssinian plateau and the Rand. Lieutenant Höhnel described the results of his journey in his book *Zum Rudolfsee und Stefanieesee* (1892). In 1892-93 he explored with an American traveler, William Astor Chanler (q.v.), the country between the rivers Tana and Juba in Central Africa. Consult W. A. Chanler, *Through Jungle and Desert* (New York, 1896).

HÖHSCHIED, hē'shit. A town of the Prussian Rhine Province, situated on the Wupper, 17 miles east-southeast of Düsseldorf. It has extensive manufactures of steel products, machinery, pocketbooks, and corsets. Pop., 1900, 14,172; 1910, 16,088.

HOIHOW, hoi'hou'. The seaport of Kiungchow (q.v.).

HOININGEN, hoi'ning-en, BARON VON. See HUENE, KARL.

HOJÉDA, ô-hā'dā, ALONSO DE. See OJÉDA.

HŌJŌ, hō'jō. The name of five towns in Japan, from one of which, in Idzu (q.v.), arose the celebrated family of regents known as the Hōjō, which during the era of the puppet Shoguns at Kamakura (1219-1333 A.D.) ruled the Empire. During their régime Buddhism developed rapidly, and the Mongol invaders under Kublai Khan were driven off and their armada destroyed. The Hōjō were overthrown by one Nitta Yoshisada in 1333. Consult: Adams, *History of Japan*, vol. i (London, 1884); Frank Brinkley, *Japan: Its History, Arts, and Literature* (Boston, 1901-02); W. E. Griffis, *The Mikado's Empire* (11th ed., New York, 1906).

HOKIONG. See FUKIEN.

HOKITIKA, hō'kē-tē'kā. The capital of

Westland County, on the northwest coast of South Island, New Zealand (Map: New Zealand, S. I., C 3), 24 miles southwest of Greymouth. It has rail connections and thriving agricultural industries, while gold mining, formerly of great importance, is carried on. Pop., 1901, 1951; 1911, 2291.

HOKKAIDO, hōk'kī'dō. See YEZO.

HOKOW, hō'kou'. The name of a number of towns in China, the most important of which are the following: 1. A town in the Province of Kiangsi, on the right bank of the Poyang-hu Lake, opposite Kiukiang (Map: China, L 6). It has an extensive trade in black tea. Pop. (est.), 300,000. 2. A treaty port in the northern part of the Province of Yunnan, on the left bank of the Red River, nearly opposite Laokai in Tongking, with which it is connected by a suspension bridge, completed in 1900. It has about 4000 inhabitants and was opened for foreign trade, as the first subport of entry for the Mengtze District, in accordance with the supplementary convention between China and France of June 20, 1895. The trade is not large. 3. A small town in the northern part of the Province of Shansi, at the confluence of the Hei-shui and the Hoang-ho. It lies near the beginning of the highway to Peking and has important soda works.

HOKUSAI, hōk'ō-sī (1760-1849). A noted Japanese artist. He was born at Honjō in Yeddo (now Tokyo), son of an artisan named Nakashima Ise, a maker of metal mirrors in the employ of the Shogun of the time. Little is known of his life beyond what he himself tells in the prefaces to his numerous works. At 13 he left home and apprenticed himself to an engraver. Five years afterward he gave up engraving to study with Shunsho, the most noted designer of the time, but was expelled in 1786 for persistently indulging in a style that was displeasing to his master. He tried to make a living by illustrating comic books, but, not meeting with success, he became a peddler, continuing to draw and paint as he had opportunity. In order to attract attention and raise money he in 1804 exhibited his dexterity by painting in public a colored figure of a Buddhist saint on a sheet of paper 18 yards long and 11 yards wide, using brooms for brushes and buckets to hold his liquid India ink. Three years later he became associated with Bakin, the novelist, and collaborated with him in illustrating a work translated from the Chinese by Bakin and containing 108 portraits of Chinese heroes. This appeared in 1828. His connection with Bakin lasted only four years, and he was again adrift. His public career really did not begin until 1810, when he became an industrial artist and a teacher of drawing. Pupils flocked to him in numbers so great that he could not supply them with original drawings of his own as models, so he began wood engraving in order to furnish the needed number. In this way his *Mangwa*, or album of 'Ten Thousand Sketches,' took form, and his fame spread as volume after volume and edition after edition appeared. The later volumes of this series appeared in 1836, a year after his *Fugakū Hyakūkei*, or *Huji Hyakke* (A Hundred Views of Fujisan). His industry was great, and his works numerous. Thirty thousand drawings of his have been counted up, yet he was always in poverty. He died April 13 (some say May 10), 1849, at Asakusa, a district of Yeddo.

Money for his funeral was provided by his pupils and admirers.

Hokusai was a man of the people to the end. He never rose above his class and never made any attempt to do so. His talent lay in producing *Ukiyo-ye* (pictures of this passing world), free from the conventionalities of his predecessors and his contemporaries. His influence on modern art has been very great. His whole life was spent in perfecting himself; yet when he came to die his last words were "If Heaven would only grant me ten more years!" and a moment later, "If Heaven had only granted me five years more, I could have been a thorough artist." His signatures were numerous. In 1798 he appears under the name of Sori, and in 1800 he called himself simply Hokusai (North Studio). A favorite signature was Hokusai Gwa-kyo Rōjin (Hokusai, the old man crazy about drawing). His latest name was Manji (the Swastika), and the inscription over his grave is the one he preferred—Manji Gwa-kyo Rōjin. A full list of his works (with a bibliography) is in Anderson's *Descriptive and Historical Catalogue of Chinese and Japanese Art* (London, 1886).

Bibliography. *Fuji Hiakki* (A Hundred Views of Fujisan, London, 1880); Anderson, *History of Japanese Art* (ib., 1886); E. F. Fenollosa, *Hokusai and his School* (Boston, 1893); *Hokusai*, a paper read by John La Farge before the Century Club (New York, 1897); E. F. Holmes, *Hokusai* (London, 1899). Consult also Frank Brinkley, *Japan: Its History, Arts, and Literature* (Boston, 1901-02). See CUT in JAPANESE ART.

HOL, RICHARD (1825-1904). A widely known Dutch pianist, organist, and composer, born at Amsterdam. A brilliant exponent of the modern Romantic German school, he received many decorations and foreign orders for his services to the cause of music. He was director of the Amstels Männerchor (1856), director of the Society for the Promotion of Music (1857), city musical director of Utrecht (1862), cathedral organist (1869), director of the School of Music (1875). Hol was perhaps better known in America as a composer of part songs for male or female voices. His compositions include an oratorio, two operas, four symphonies, masses, songs, chamber music, orchestral music, etc. His male choral works are standard with the leading men's choruses.

HOLABIRD, SAMUEL BECKLEY (1826-1907). An American soldier, born in Canaan, Conn. He graduated at West Point in 1849, served with the Army of the Potomac (1861-62), and became brigadier and quartermaster-general (1883), as well as translator for the army. His chief translation was General Jomini's *Treatise on the Grand Military Operations of Frederick the Great* (1865).

HOLADIN. An extract of the pancreas, the entire gland being used. Holadin possesses the property of digesting starch and proteids and splitting up fats in the same way as the pancreatic juice. It is given in capsule form and is useful in some cases of indigestion.

HOLARCTIC REGION (from Gk. ὅλος, *holos*, entire + ἀρκτικός, *arktikos*, northern, from ἀρκτος, *arktos*, bear). A division in zoogeography, defined in two senses: 1. *Arctogæa*.—In the larger sense the term is used unhappily as a synonym for "Arctogæa." (See DISTRIBUTION OF ANIMALS; NOTOGÆA.) This "region" em-

braces all of the Northern Hemisphere except the hot coast regions of Central America, all of Africa and Madagascar, and an indefinite extent of the Malayan and Polynesian islands, where its boundaries vary in different classes of animals; in other words, it is a combination of the Nearctic, Palearctic, Paleotropical, and Oriental regions of Scater and Wallace, as opposed to the combined Neotropical and Australasian regions (Notogæa). The fundamental difference between Arctogæa and Notogæa reaches back to an early geological period, while many of the present distinctions between their subdivisions disappear when traced back to the Tertiary, when the distribution of animal life was very different from now. It is this broad historical view, rather than the modern aspect, which has led naturalists to the generalizations of Arctogæa and Notogæa. Limiting the comparison to vertebrate animals, the characteristics of Arctogæa are in outline as follows: Among fishes, the perches, carps, salmons, and sturgeons are present as whole tribes, together with many lesser groups, especially of freshwater or coast fishes, while the lungfishes are conspicuous absentees. In the class Amphibia the line is drawn at the frog family, Cystignathidæ, which is entirely Arctogæan. Gadow also points out the predominance of Arcifera, which constitute nine-tenths of the anurous population and are hardly represented in Notogæa. Of turtles, the presence of Trionchoidea and the absence of Chelydida are distinctive. Of lizards, exclusively Arctogæal groups are the Lacertidæ, Zomoridæ, Gerrhosauridæ, and Aneliidæ. Among the snakes, the viper family is entirely Arctogæal, and the crotaline tribe mainly so. Lesser exclusive groups are the Uropeltidæ, Xenopeltidæ, and many genera. Ornithological distinctions may be most easily sketched by saying that Arctogæa possesses no emus or cassowaries, no mound birds, birds of paradise, lyre birds, cockatoos, tinamous, curassows, hoatzins, toucans, cotingas, or many others, although it is rich in game birds, finches, woodpeckers, wood warblers, and the like. But perhaps the most striking difference is the presence of the large Arctic tribe of auks and the like and the absence of penguins. Among mammals, also, the most notable feature is the entire absence of edentates, of monotremes, of marsupials (except one opossum), of cebine monkeys, and of marmosets. The northern region, however, has the lemurs, the insectivores except the West Indian Solenodon, the elephants, rhinoceroses, hyraces, horses, deer, giraffes, bovines, hyenas, hares, and a variety of other important families; it is, in fact, as Beddard points out, the headquarters of all the Eutheria except edentates and marsupials.

2. *Holarctic, or Periarctic, Province.*—In a more restricted and perhaps more usual sense the term "holarctic" in zoogeography denotes a circumpolar district formed by the union of the Palearctic and Nearctic provinces of Scater and Wallace, elsewhere described. It was long ago felt that the faunal characteristics of North America and the northern part of the Old World were not sufficiently distinct to justify their separation into two provinces. Their union under one name was first made by A. Heilprin, who proposed "Triarctic" as the new designation. For this A. Newton suggested the substitution of "Holarctic," which Heilprin at once adopted. More recently Gadow has used "Peri-

arctic" as a synonym, on the ground that it is more precise. Its faunal characteristics are those sketched in the first paragraph, with the omission of such forms as are exclusively Ethiopian (Africa, south of the Sahara) or Oriental (the Asiatic coast and islands south of the Himalayan watershed). The faunal agreement between North America and the northern part of the Old World is greater than any differences. There are few families not represented in both, and the distinctive animals are mainly local genera or species, while a great many apparently identical forms occur on both continents, having a circumpolar distribution due either to their powers of travel or to ancient land connections. Consult: Angelo Heilprin, *Geographical and Geological Distribution of Animals* (New York, 1887); Alfred Newton, *Dictionary of Birds* (ib., 1896); J. G. Bartholomew, *Atlas of Zoogeography* (London, 1911), and the authorities referred to under DISTRIBUTION OF ANIMALS. See also NEARCTIC REGION; PALEARCTIC REGION.

HOLBACH, ôl'bäg, PAUL HENRI THYRY D'BARON (1723-89). A French philosopher of the eighteenth century and one of the Encyclopædists. (See ENCYCLOPÉDIE.) He was born of wealthy parents at Heildelsheim in the Palatinate in 1723. At an early age he went to Paris, where he continued to reside during the remainder of his life. His personal popularity and his generous hospitality drew to his house the most eminent thinkers and writers of the day, such as Condorcet, Diderot, Duclos, Helvétius, Raynal, Rousseau, Buffon. The witty Abbé Galiani called Holbach the *maître d'hôtel* of philosophy. Here speculation, it is said, was carried to such daring lengths that Buffon, D'Alembert, and Rousseau were compelled to withdraw from the circle. Holbach was the zealous champion of naturalism and contended not only against Christianity but against all positive religion. His principal work, the *Système de la nature* (published anonymously in 1770), has been called the "Bible of Naturalism." In this work the author endeavors to expound the principles of morality upon a sensualistic, materialistic, deterministic, egoistic, and atheistic basis. For him God is only an ideal being, created by kings and priests. The work is in no sense original, but gives voice to the materialism of the French *philosophes* of the eighteenth century, which is nowhere more openly advocated than in the writings of Holbach. In 1774 he published *Système Social* (London) and in 1776 *Ethocratic; ou le gouvernement fondé sur la morale* (Amsterdam). He was a man of good heart and of most unselfish benevolence. When the Jesuits fell into disgrace during the reign of Louis XV, Holbach, though he hated their system and had written against them in the days of their prosperity, made his house an asylum for his old foes when the clouds gathered around them. Many anonymous works besides the *Système* have been attributed to Holbach.

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Tallentyne), *The Friends of Voltaire* (New York, 1907), and the histories of modern philosophy.

HOLBEIN, hól'bín, HANS, THE ELDER (c.1460-1524). A noted German painter of the Swabian school. The little known of his life is derived from the tax and court records of Augsburg, where he was born, the son of the tanner Michael Holbein, and where he resided at intervals for many years, alternately prosperous and in want. He is mentioned as a citizen of Ulm in 1499 and two years later was active in Frankfurt. In 1502 he was again in Augsburg, where in 1506-08 he executed commissions for the cathedral, the records of which show him in dire financial straits. In 1517 he was sued for debt by his brother, and the same year he visited Frankfurt. After 1516 he lived at a short distance from Augsburg and in 1517 wandered off to paint an altarpiece for the priory of St. Antony at Issenheim. Here he probably died c.1524, when he is mentioned as deceased in the records of the Augsburg guild.

With whom the elder Holbein studied is not known. That he worked in the studio of Martin Schongauer at Colmar is a surmise suggested by a certain resemblance of style, especially in the types of his heads. Undoubtedly Holbein formed his style on the models of the early Flemish school and subsequently modified it by yielding to local tradition and Italian influences. In his early pictures slender figures, mild and regular features, staidness of attitude, and a clear transparency of tone unrelieved by depth of shadow are the prevailing characteristics. To this class belong the Weingartner altar (1493), treating the "Life of the Virgin" in four separate panels, now in the cathedral of Augsburg; the altar of St. Afra, representing the death of that saint; and "Death" and "Coronation of the Virgin"—the first and last in the archiepiscopal palace at Eichstätt, the other in the Museum of Basel; and a large "Death of the Virgin," in private possession, Paris. Of a similar stamp are four altar panels (1493), representing "Jacob's Sacrifice," "Birth and Presentation of Mary," and "Presentation of Christ," in the cathedral of Augsburg. Somewhat less marked is the Flemish origin of the master's manner in the large altarpiece (1499) with the "Basilica of Santa Maria Maggiore" in the centre, "Coronation of the Virgin" above it, the "Nativity" and "Martyrdom of St. Dorothea" in the wings, complete in the Gallery at Augsburg. From the same period date the small Madonna in the Germanic Museum, Nuremberg, the 12 passion scenes in the Gallery at Donaueschingen, and the "Ecce Homo" in the Gallery of Strassburg. In Frankfurt he painted for the Dominicans a composite altarpiece (1501), comprising the "Last Supper," "Entry of Christ into Jerusalem," "Expulsion of the Jews from the Temple," etc., and "Seven Scenes from the Passion"—all now in the Städel Institute. In 1502 he painted the large altarpiece for the monastery of Ratisheim near Donaueschingen, of which 16 are in the Old Pinakothek, Munich, and three at Augsburg. The outer, painted by his assistants, represented scenes from the "Passion of Christ"; the far better inner panels, by the painter himself, scenes from the "Life of Mary." To this period belong other works in the Augsburg Museum, at Nuremberg, Basel, Schleissheim, and elsewhere. Of the same period are the "Crucifixion," "Descent from the Cross," "Entombment," and "Transfiguration," also "Sixteen Scenes from the

Life of Mary"—all parts of a large altarpiece in the Old Pinakothek at Munich. A marked progress in the master's manner is to be noticed in the "Basilica of St. Paul" (1504), with scenes from the life of that saint, in its more ideal conception, correct drawing, and delicate execution, and of traditional interest as containing the portraits of the artist and his two sons, Ambrosius and Hans. The influence of the Italian Renaissance is still more apparent in the greater expressiveness and beauty of color displayed in the four panels of the "St. Catharine Altar" (1512)—this and the preceding also in the Augsburg Gallery; but his maturest work is the "Altar of St. Sebastian" (1515-16), in the Pinakothek at Munich. The central panel, representing the martyrdom of the Saint, is a composition full of dramatic power, far transcending his previous efforts; the wings, two delightful female saints. His last important work was probably the "Fountain of Life" (1519), in the National Museum at Lisbon. Holbein the Elder also excelled as a portrait painter, and his rare gift for characterization is apparent especially in the numerous head studies, mostly in silver point, distributed in various collections, among which those in Berlin, Copenhagen, and Basel are the richest. Very interesting examples are those of the painter himself (Chantilly), of his brother Sigismund Holbein (Berlin), and his sons Ambrosius and Hans (ib.). The museum at Basel also possesses a number of sketches for his religious paintings. Mention should be made also of his designs for stained glasses, after which two fine windows survive in the cathedral of Eichstätt, and of his designs for copper engravings, carried out by Israhel Meckenen.

His brother SIGISMUND (?-1540) first appears on the rate books of Augsburg in 1504 and in 1519 removed to Bern, where he died, making his nephew, Hans the Younger, his heir. There is very little doubt that he assisted the elder master in several of his most important works, although no single picture can be traced to him directly.—AMBROSIUS (c.1494-c.1519), son and pupil of Hans the Elder, was born in Augsburg and with his brother, Hans the Younger, was sent to Basel about 1515, when both were engaged chiefly in designing title-pages, initials, and other illustrations for books. The art of Ambrosius shows the influence of his father's teaching and his younger brother's example, without attaining the latter's excellence. In 1517 he was admitted into the guild Zum Himmel and acquired the freedom of the city in the year following, but all trace of him is lost after 1519. The museum at Basel preserves, besides many drawings, three authenticated paintings by him, "Christ Crowned with Thorns" and two "Bust Portraits of Boys," besides which the portrait of the goldsmith Georg Schweiger, of Augsburg, may also be attributed to him with tolerable certainty. Other portraits are in the museums of Darmstadt and St. Petersburg and in the Ambras collection, Vienna. A portrait of a young man (1518) is in the Hermitage at St. Petersburg.

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The best monograph on Holbein the Elder is by Glaser (Leipzig, 1908); an earlier work is by Stödtner (Berlin, 1896). Consult also the prin-



HOLBEIN

"THE MADONNA OF THE BURGOMASTER MEYER," FROM THE PAINTING
IN THE DARMSTADT GALLERY

principal works cited on Hans Holbein the Younger. For Ambrosius Holbein, see the monograph by Hess (Strassburg, 1911).

HOLBEIN, HANS, THE YOUNGER (1497-1543). A German painter and designer, one of the chief masters of the German Renaissance. He was a son of Hans Holbein the Elder and was born at Augsburg, where he studied with his father and with Hans Burgkmair. Two of the works which may have been painted in his father's workshop survive: a "Madonna" (1514), in the Museum of Basel, and "Christ Bearing the Cross," in the Gallery at Karlsruhe. Both resemble the work of his father, to whom the latter picture has also been ascribed. In 1514 the family left Augsburg, and early in 1515 we find Holbein at Basel, where he and his elder brother Ambrosius had probably come to make illustrations for books; Basel was then an important centre of the book trade. Here Hans was introduced into the classic world, especially through his association with Beatus Rhenanus, corrector for the printer Froben. This influence is revealed in the table plate in the Museum of Zurich, which he painted for the family Baer, with scenes of hunting, fishing, and knightly tourneys, and in his 83 pen drawings for Erasmus's *Praise of Folly*, which are in the Museum of Basel. These drawings are a curious mixture of the coarse style of the fifteenth century and the more refined manner of the sixteenth. They show a great master at the beginning of his powers. The Museum of Basel contains two characteristic works of 1516: a sign for a schoolmaster, on which are painted two school scenes, and the double portrait of Burgomaster Jakob Meyer and his second wife; "Adam and Eve" of 1517, besides undated heads of the Virgin and St. John, and five Passion scenes of the same period.

In 1517 he went to Lucerne to decorate the façade and interior of the house of Jakob Hertenstein. Excepting a fragment in the Museum of Lucerne, these paintings have perished; but the original pen design in the Museum of Basel shows that the façade was decorated with classical subjects, completely in the style of the sixteenth century, and that he was influenced by the study of Mantegna's prints. At this time (1517) he painted the remarkable portrait of Benedikt von Hertenstein, now in the Metropolitan Museum, New York, and probably other members of that family. In 1518 he probably traveled in Lombardy, visiting Milan. The influence of the Lombard school may be seen in Holbein's modeling and chiaroscuro after 1518, in such works as his "Last Supper" (Basel Museum), which closely resembles Leonardo's masterpiece at Milan.

In 1519 Holbein entered the painters' guild of Basel, and in the following year he became a citizen. During the next few years he decorated the façades of a number of houses at Basel, chief among which was the Haus zum Tanz, of which the original pen design is in the museum, with architectural decorations and a representation of peasants dancing. He also began his extensive decorations of the council chamber, with antique historical subjects representing civic virtue and justice and with allegorical figures. On the organ doors of the minster of Basel he painted, in brown monochrome, grandiose figures of saints and angels singing. Among his panel pictures is an altarpiece of "Passion Scenes," of great dramatic power and fine effects of light and shade, and the "Dead Body of Christ" (1521), of strik-

ing, almost repulsive realism—all in the Museum of Basel. Among other works of this period is the "Madonna with Saints Ursus and Martin" (1522), in the Museum of Solothurn.

Holbein's best-known altarpiece is the "Madonna of Burgomaster Meyer," painted in 1525 or 1526, which holds the same rank in German painting as the "Sistine Madonna" in Italian. The original is in the Gallery of Darmstadt, the Dresden example having been proved to be an excellent copy by a Netherlander of the seventeenth century. Especially fine, in this picture, are the portraits of the kneeling burgomaster and his family, and the nude figure of his youngest son—a cherub worthy of Correggio.

His portraits of this period include the refined face of Bonifazius Amerbach (1519), the first great German art collector; three likenesses of Erasmus, who was then a resident of Basel—two in profile, at Basel and in the Louvre, and a larger three-quarter view in Longford Castle; the portrait of an unknown young woman, probably Holbein's wife, in the Museum of The Hague; his own portrait in colored chalk at Basel; and two allegorical representations of the courtesan Dorothea Offenburg in the Basel Museum (1526), as "Lais of Corinth" and as "Venus" with Cupid.

At the same time Holbein was occupied with other forms of design. Among his drawings of the period are two admirable youths—one a pencil, supposed to represent Holbein himself, the other a chalk drawing in the Museum of Basel. One of his favorite subjects was the contemporary German "Lanzknechte" (soldiers), in various actions and attitudes. To the same period belong his drawings of female costumes, then current in Basel, which may have been designs for actual use. His designs for glass painting in the Basel Museum include 10 wash drawings of "Passion Scenes," the equals of the painted series mentioned above, Madonnas and other biblical subjects, and coats of arms—all in beautiful Renaissance framing. As a designer for woodcuts, Holbein is second only to Dürer. He left over 300 blocks, the best of which were cut by Hans Lützelburger. His illustrated Luther's Bible, and his "Historiarum Veteris Instrumenti Icones" (Pictures from the Old Testament), 91 plates, were first published together at Lyons in 1538. Best known of all is his "Dance of Death," 58 plates in all, replete with humor and satire upon the ecclesiastical and social conditions of the day. It was published in book form at Lyons in 1538 and has been often republished; a good modern edition is that of Lippmann (Berlin, 1878).

The advent of the Reformation and the consequent disturbances in Basel were the chief cause of Holbein's journey to England in 1526. Equipped with recommendations from his friend Erasmus, he found a ready welcome in the house of Sir Thomas More at Southwark. His activity during his stay there, which lasted two years, may best be studied in the fine series of chalk drawings at Windsor Castle (published in London, 1884). In 1527 he painted Sir Thomas More, now in possession of Henry Huth, London; Sir Henry Guildford, in Windsor Castle; and Archbishop Warham, of Canterbury, in Lambeth Palace (replica in the Louvre), the best of all—a wonderful piece of realism and strength. Among his portraits of 1528 are those of Nicholas Kratzer, the King's astrologer, in the Louvre, and of Thomas Godsalve and his son John, at

Dresden. His famous picture of More and his family is lost, but the studies for the heads are at Windsor, and the pen sketch which he brought back for Erasmus is still at Basel. Among undated portraits of his first English period are those of Sir Henry Wyatt (Louvre), and several of Sir Bryan Tuke, of which the best-known version is at Munich.

On his return to Basel in 1529 he purchased a house. But during his stay the storm of iconoclasm broke over the city, and the demand for religious pictures ceased. Holbein, indeed, finished his frescoes in the council chamber, adding two large subjects from the Old Testament, "Samuel Reproving Saul" and "Rehoboam's Pride." Both paintings are lost, but the sketches in the Museum of Basel, masterly in composition and dramatic action, show Holbein as a great historical painter. In 1529 he painted one of the finest and certainly the most pathetic of all of his portraits, that of his wife with her two children (Basel Museum); two portraits of Erasmus (Parma and Basel); and one of Melanchthon (Hanover). Notwithstanding the efforts of the burgomaster and council of Basel to retain him, he returned in 1532 to England.

On his arrival at London he resided with the German merchants of the Steelyard, with whom he found occupation. In 1532 and in the following years he painted a number of portraits of these merchants, of which examples survive at Vienna, Windsor, Munich, Brunswick, and Petworth. The most remarkable of these fine portraits is perhaps that of George Gysse (1532), in the Museum of Berlin, noted for its easy pose, wonderful treatment of light and shade, and exquisite balance of detail and general effect. On the occasion of Anne Boleyn's coronation he designed for the German merchants an allegorical pageant of Parnassus; he decorated their guildhall with two large paintings, of which there are sketches in the Louvre, "Triumph of Riches" and "Triumph of Poverty." It is not known when he first entered Henry VIII's service, but in 1536 we find him mentioned as the King's painter. In that year he painted the portrait of the Queen, Jane Seymour (Hofmuseum, Vienna), in the following year the King (Earl Spencer, Althorp), and afterward (1538-39) their son Edward, Prince of Wales (Hanover). In 1537 he was sent to Brussels to paint the portrait (now in the National Gallery, London) of Christina of Denmark, Duchess of Milan, whom the King thought of marrying, and in 1539 to portray Anne of Cleves, whose portrait (now in the Louvre) had much to do with the King's marrying her. The same year he again portrayed the King (National Gallery, Rome) and in 1540-41 the Queen, Catharine Howard. His chief work for Henry VIII was a group painted on the wall of the Privy Chamber at Whitehall, in 1537, representing the King with his father and mother and Jane Seymour. This painting was destroyed in the fire of 1698, but the cartoon of the King is at Hardwick Hall, and there are several copies of the portrait, the best known of which is at Windsor Castle. The King also commissioned him to design various decorations, especially in the goldsmith's art, in which he acquitted himself with great taste and ability, as is evident from the original designs in the British Museum and elsewhere. In 1538 he visited Basel, where he was banqueted by the council, and he promised to return after two years, which promise, however, he did not keep.

His principal portraits, executed during his last stay in England, besides those mentioned above, are: "The Ambassadors" (1533), in the National Gallery; Robert Cheeseman (1533), the King's falconer, at The Hague; Thomas Cromwell, at Tittenhanger; John Reskitamer, at Hampton Court; Hans of Antwerp, in the Windsor and Salting collection, London; the French Ambassador, Sieur de Morette, at Dresden, a magnificent achievement; Thomas Howard, Duke of Norfolk, at Windsor; Lady Rich (c.1536) and Margaret Wyatt, Lady Lee (c.1539), in the Altman collection, Metropolitan Museum, New York; two unknown men (1541), at Berlin and Vienna, and an unknown woman, at Vienna; Dr. John Chambers, the King's physician, at Vienna; Sir William Butts and Lady Butts, in the Gardner collection, Boston; the Artist (1543), Uffizi; and Simon George, at Frankfurt.

Another important part of his activity at the English court was the painting of miniatures, in which art he achieved an unsurpassed mastery. Within the narrow bounds of the miniature he achieved unusual largeness of expression; and his light, delicate touch, thinness of color, and subtle modeling are particularly adapted to this technique. Authentic miniatures by him are very rare. The J. P. Morgan collection (Metropolitan Museum, New York) is richest with eight authentic examples, including two of Henry VIII, Sir Thomas More, and Mrs. Pemberton; five are in the royal collection at Windsor Castle; and others are in the Royal collection of The Hague, in Florence, in Munich, in the Wallace collection and the South Kensington Museum, London. He also designed a number of important wood engravings, including the title-page of Coverdale's Bible, illustrations of Cranmer's catechism, and "King Henry in Council," the title-page of Hall's *Chronicle*.

Holbein died of the pestilence in London in the autumn of 1543. He is chiefly known as a portrait painter; but his religious pictures, and especially his mural decorations, show that, had the opportunity presented itself, he might have been one of the greatest historical painters of all times. In England he was compelled by the taste of his noble patrons to adopt an archaic style, with emphasis on detail and neglect of light and shadow, his predilection; but these restrictions did not prevent his development into one of the world's greatest portraitists. The most striking quality of his portraits is their absolute truthfulness. "He is the one painter whom one can never suspect of flattery . . . whose entire veracity is unquestionable." They are rendered with an objectivity and absence of sentiment attained among the old masters only by Velazquez. They charm also by an impeccable draftsmanship, "with an accuracy unknown before or since." This phase of his activity may best be studied in his inimitable drawings, preserved more especially at Windsor and Basel. Designed as rapid preliminary sketches for his portraits, they cause even greater pleasure by reason of their greater freedom and directness. The composition of both his drawings and portraits is of the very first rank. In color his handling is "tight," and he prefers smooth enamel-like surfaces, but with complete mastery of values, consummate treatment of light and shadow, great purity of individual color, in bright as well as grave harmonies. Dürer was a greater genius, a greater thinker, a

greater engraver; but Holbein was the greatest painter Germany has ever produced.

Bibliography. A complete bibliography of Holbein up to 1900 was published in *Schweizerisches Künstlerlexikon*, vol. i (Frauelfeld, 1900). The most important monographs are the folios of Mantz (Paris, 1879), Davies (London, 1903), and A. B. Chamberlain (2 vols., New York, 1913). Of very great value are the researches of Paul Ganz, published in various German and Swiss periodicals and in works cited below. Of earlier monographs, those of Wornum (London, 1867) and Woltmann (Leipzig, 1874-76; Eng. trans., London, 1872) are best; popular biographies are those of Knackfuss (Bielefeld, 1897) and Gauthiez (Paris, 1908). The most complete edition of his drawings is in course of publication by Ganz (Berlin, 1911 et seq.); those at Windsor were published by Holmes with Hanfstängel's reproductions (n. d.). A convenient selection is that of Baldry (London and New York, 1904). For other designs, consult Hiis-Hausler, *Dessins d'ornements de Hans Holbein*, fol. (Paris, 1886); Goethe, *Holbeins Totentanz* (Strassburg, 1897). For his engravings, see Hind, in the *Great Engravers Series* (London, 1912); for miniatures, Williamson, *History of Portrait Miniatures*, vol. i (ib., 1904). A delightful appreciation of Holbein is by the painter Kenyon Cox in his *Painters and Sculptors* (2d series, New York, 1907).

HOLBERG, hól'bérǵ, LUDVIG, BARON (1684-1754). A Norwegian-Danish poet, novelist, dramatist, and historian, born at Bergen, Norway. He is called the "father of Danish comedy." Left an orphan in childhood, he proved an eager student in spite of poverty and discouragements and supported himself precariously as tutor for some years, in the course of which he visited Holland, Germany, and England, and studied for two years at Oxford. He lectured in the University at Copenhagen, where his scholarship was recognized, though not remunerated. Some historical studies in manuscript attracted the attention of King Frederick IV, and Holberg received a traveling scholarship that took him through a great part of Europe, largely on foot. He returned to Denmark in 1716 and in 1718 published *An Introduction to Natural and Popular Law*, which brought him a professorship in the University of Copenhagen and a modest competence. Thus eased, his genius welled up in the seriocomic epic *Peder Paars* (1719), a brilliant satire on contemporary manners, followed by five others, hardly less successful. In 1721 he was made director of the first Danish theatre in Copenhagen, for which he wrote during 1722 five classic comedies and in 1723 10 others. His best comedy, *Henrik and Pernille*, belongs to 1724. The theatre failed, and Holberg closed his dramatic career by publishing his collected comedies in 1731. Adapting himself to a change in the national spirit, he turned to history, philosophy, and satire, writing much that is now forgotten, and also the famous satire, *Subterranean Journey of Niels Klim* (*Nicolai Klimii Iter Subterraneum*, 1741), which was thrice translated from Latin into Danish, 10 times into German, three times into Swedish, English, and Dutch, twice into French and Russian, and once into Hungarian. He published also five volumes of *Letters* (1748-54). He shares with Voltaire the preëminence in European literature in his generation. He made Danish a literary language and won for it aristocratic recognition.

His influence has endured for two centuries. Editions of his works are countless; the best edition of the *Comedies* is by Lichtenberg (Copenhagen, 4th ed., 1893; illustrated jubilee ed., 1883-88). The Holberg Society, founded at Copenhagen in 1842, oversaw (1848-54) a critical edition of Holberg's comedies in eight volumes. There are biographies by Prutz (Stuttgart, 1857), Smith (Copenhagen, 1858), and Horn (ib., 1884). Consult also: Legrelle, *Holberg considéré comme imitateur de Molière* (Paris, 1864); O. Skavlan, *Holberg som Komædieforfatter* (Christiania, 1872); Georg Brandes, *Holberg und seine Zeitgenossen* (Berlin, 1884); *Holbergliteratur i det Deichmanske Bibliothek* (Christiania, 1906).

HOLBORN, hō'bŭrn. A district and street in London. The name is derived from Old or Hole Bourne, the former name for a part of the Fleet, which ran through a valley. The depression is now crossed by the famous Holborn Viaduct, an iron structure 27 yards wide and 657 long, built in 1869 to facilitate communication by avoiding the ascent of Holborn Hill. Criminals formerly passed through Holborn on their way to execution and according to an old custom received a nosegay at St. Sepulchre's Church, near Newgate Prison, from which the thoroughfare leads west to New Oxford Street. On Holborn are Barnard's, Furnivall's, and Staple Inn, and near it are Ely Chapel, Gray's Inn, and Lincoln's Inn. Milton at one time lived on the western portion of the street, called High Holborn. A number of picturesque old houses stand on this street, which survived the Great Fire.

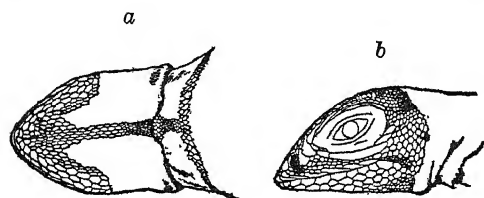
HOLBROOK. A town in Norfolk Co., Mass., 14 miles south of Boston, on the New York, New Haven, and Hartford Railroad (Map: Massachusetts, E 4). It contains a public library, and has extensive manufactures of boots and shoes. Holbrook has become a popular residential suburb of Brockton and Boston. It was first incorporated on Feb. 29, 1872. Pop., 1900, 2229; 1910, 2816.

HOLBROOK, JOHN EDWARDS (1794-1871). An American physician and naturalist, born in Beaufort, S. C. He graduated at Brown in 1815 and in medicine at the Pennsylvania University three years later, studied afterward in Europe, and began practice in Charleston in 1822. In 1824 he was made professor of anatomy in the South Carolina College. This position he retained for more than 30 years. While there, he began work on *The Ichthyology of the South*, which was not finished. Part of it, however, was published in 1854 as *The Ichthyology of South Carolina*. His previous work upon *American Herpetology* (5 vols., 1842) was highly commended by Agassiz and others.

HOLBROOKE, JOSEF (1878-). An English composer, born at Croydon. He studied at the Royal Academy of Music in London under Westlake (piano) and F. Corder (composition), graduating in 1898. Thereafter he devoted his entire time to composition. His music is extremely modern, finding its inspiration chiefly in tragic, frequently in fantastic subjects. The chamber-music works, of which he wrote a considerable number, are the least satisfactory, because the themes generally are of a character that calls for orchestral treatment. His talent shows itself most advantageously when employing the orchestra for its expression. But here also one encounters many strange and even bizarre effects in harmonization and instrumentation.

His compositions for orchestra are an overture, *The New Renaissance*; the symphonic poems: *The Raven*, *Ode to Victory*, *The Skeleton in Armor*, *Ululume*, *Queen Mab*, *The Mask of the Red Death*, *Apollo and the Seaman*. A choral work with orchestra, *The Bells*, gave rise to much discussion after its first performance at the Leeds Festival of 1907; while his opera *The Children of Don*, produced by Hammerstein at the London Opera House in 1912, proved a puzzle to many serious musicians. A sequel to this opera, *Dylan*, was produced at Drury Lane in 1914. An earlier opera, *Pierrot and Pierrette*, was given in 1909.

HOL'BROOK'IA (named in honor of the American naturalist J. E. Holbrook). A genus of iguanid lizards of the southwestern United States and northern Mexico, especially characteristic of the Rio Grande valley. The half-dozen species are of moderate size, with short legs,



HOLBROOKIA MACULATA.
a, underside of head; b, profile.

squat depressed bodies, covered with minute scales, and long tails. The general color is gray, and all are blotched, spotted, and barred (on the tail) with darker tints, but the colors are highly variable; hence they are popularly known as spotted lizards. They prefer rocky ground and run swiftly with their tails curved over their backs. They subsist mainly on insects, worms, and the like, but also take vegetable food. They make interesting pets. When placed in a fly trap, they pick out the very large, black, and bright-colored flies before eating the house flies. See **IGUANA**.

HOLCOMBE, hōl'kūm, CHESTER (1844-1912). An American author and diplomat, born at Winfield, N. Y. After graduating from Union College in 1861, he went to China, where he was interpreter and Secretary to the United States Legation at Peking in 1871-85 and acting Minister in 1875-76, 1878-79, and 1881-82. He assisted the United States government in making treaties with China in 1880 and with Korea in 1882. In 1896 he prepared the Chinese and English documents for the government loan of \$100,000,000, and later he drew up in both languages plans for the construction of 3000 miles of Chinese railroads. He was a lecturer of the Lowell Institute, Boston, in 1902. His writings in Chinese include *Mental Arithmetic* (1873), *Life of Christ* (1875), and a translation of the American Declaration of Independence; in English, *Travels in Western China* (1875), *The Practical Effect of Confucianism upon the Chinese Nation* (1882), *Catalogue and Handbook of Antique Chinese Porcelains* (1890), *The Real Chinaman* (1895), *The Real Chinese Question* (1900), *China's Past and Future* (1904).

HOLCROFT, hōl'krōft, THOMAS (1745-1809). An English dramatist and novelist, born in London. The son of a shoemaker, he learned his father's trade; later he was a stable boy, a tutor,

an actor, journalist, printer, and lastly a playwright. In 1783 he was correspondent in Paris for the *Morning Herald*. In 1784 he translated the *Mariage de Figaro* from memory and produced it at Covent Garden, himself playing the leading rôle. He wrote 30 plays, the best and most successful of which is *The Road to Ruin* (1792), still occasionally acted. During the French Revolution he became a member of the Society for Constitutional Information, and was indicted (1794) for high treason, imprisoned, and finally discharged without trial. He was a man of great industry. He learned French, German, and Italian, and translated many works, including Goethe's *Hermann und Dorothea* (1801), Lavater's *Physiognomische Fragmente* (1793), and some of the works of Frederick the Great. He was also the author of four novels and numerous poems—*Alwyn* (1780); notable among the former, and *Human Happiness* (1783) among the latter. His *Memoirs*, written by himself or compiled from his diary and other papers, by William Hazlitt, were published after his death (3 vols., 1816).

HOL'CUS. See **SOFT GRASS**.

HOLD (older form *hole*, from Dutch *hol*, hole, hold; connected with AS., OHG. *helan*, Ger. *hehlen*, Lat. *celare*, Gk. *καλύπτειν*, *kalyptein*, to hide, OIr. *celim*, I hide; confused in popular etymology with *hold*, to contain). That portion of the interior of the ship which is below the upper deck. This part of a ship may be divided into several parts, as the *forepeak*, the *forehold*, the *main hold*, the *after hold*, the *engine and boiler rooms*, *coal bunkers*, *storerooms*, etc. To *stow* a hold is to put things in it and arrange them properly; to *break out* a hold is to remove the contents of it.

HOLD. In music, a sign placed above (∩) or below (∪) a note or rest to indicate that its time value is increased. The length of a hold is governed by the rhythm of the music and is left to the performer's discretion. See **GENERAL PAUSE**.

HOLDEFLEISS, hōl'de-flis, FRIEDRICH WILHELM (1846-). A German agricultural chemist. He was born at Bennstedt and studied at Halle, where for several years he acted as assistant in the Agricultural Experiment Station and in the Agricultural Institute of the university. In 1878 he was appointed director of the agricultural station of the Central Silesian Agricultural Society at Breslau. In 1881 he became professor extraordinary and in 1882 ordinary professor of agricultural chemistry in the Agricultural Institute of the University of Breslau. After filling this position with distinction for 10 years, he was appointed director of the Institute. During his incumbency he was actively engaged in the preparation of numerous works dealing with his specialty. Among these may be mentioned: *Untersuchungen über den Stallmist* (Breslau, 1889); *Das Knochenmehl* (Berlin, 1890); *Die Rinderzucht Schlesiens* (Breslau, 1896); *Schatzkästlein des praktischen Landwirts* (Berlin, 1896).

HOLDEN, hōl'den, EDWARD SINGLETON (1846-1914). An American educator and astronomer. He was born in St. Louis, Mo., and was educated at Washington University and at West Point, where he graduated in 1870. He occupied successively the positions of professor of mathematics, United States navy (1873-81), director of the Washburn Observatory, Madison, Wis. (1881-85), president of the University of California (1885-

88), and (1888-98) director of the Lick Observatory, Cal., where his most important work was done. Most of the buildings and instruments of this institution were designed and built under his direction. In 1901 he was appointed librarian of the United States Military Academy. He was a member of the National Academy of Sciences and of various foreign learned bodies, including the Royal Astronomical Society, London. Besides editing various publications, he wrote: *Bastion System of Fortification* (1872); *Life of Sir William Herschel* (1881); *Mountain Observatories* (1896); *Elementary Astronomy* (1899); *Essays in Astronomy* (1900); *The Sciences* (1903); *Galileo* (1905).

HOLDEN, HUBERT ASHTON (1822-96). An English classical scholar. He studied at King Edward's College, Birmingham, and graduated from Trinity College, Cambridge, in 1845, was tutor and lecturer at Trinity in 1848-53, vice principal of Cheltenham College in 1853-58, and head master of Queen Elizabeth's School, Ipswich, in 1858-83, and in 1890 became a fellow at the University of London. His best-known texts are *Foliorum Silvula* (4 parts, 1852; part i, 18th ed., 1910); *Foliorum Centuriæ* (1852; 12th ed., 1901); *Folia Silvulæ* (2 vols., 1865-70). He also edited Cicero's *De Officiis* (1869; 6th ed., 1886) and *Pro Publio Sestio* (1883; 3d ed., 1889); Xenophon's *Hieron* (1883; 3d ed., 1888) and *Economicus* (1884; 4th ed., 1889); and various other texts.

HOLDEN, SIR ISAAC (1807-97). A British inventor, who produced lucifer matches and improved wool-carding machinery. He was born in Hurlet, Renfrewshire, of English parents, and from being a drawboy to hand weavers, he went into a Paisley cotton mill, educating himself meanwhile till he was able to teach school. In the course of experimenting for a chemistry class he discovered the efficiency of sulphur as a medium between the explosive matter and the wood for matches (1829); but, as he took out no patent, others reaped the benefit of his invention. He was next bookkeeper, then manager, then owner of a wool-combing mill, and made such important improvements in its machinery that he became a wealthy manufacturer. He was elected to Parliament in 1865 and was knighted in 1893.

HOLDER, hōl'dēr, ALFRED (THEOPHIL) (1840-). A German philologist. He was born in Vienna, the son of a portrait painter, was educated at Heidelberg and Bonn, taught in the Rastatt Lyceum and in a private secondary school at Ryswick, and in 1867 entered the Karlsruhe Hofbibliothek, of which he became librarian in 1870 and the manuscripts of which he described in volumes published from 1895 to 1914. His other publications are in widely different fields, including *Altoeltischer Sprachschatz* (1896-1914, particularly important for Gaulish), and editions of Horace (1864-70), with Keller—still the best critical text; of Waltharius (1874), with Scheffel; of Tacitus' *Germania* (1878); of the *Lex Salica* (1879-80); of Cæsar's *Bellum Gallicum* (1882); of Saxo Grammaticus (1886), the only recent complete edition; of Herodotus (1886-88); of Avienus (1887); of Porphyrio's scholia on Horace (1894); of Cæsar's *Civil War* (1898); etc.

HOLDER, CHARLES FREDERICK (1851-1915). An American naturalist. Born in Lynn, Mass., of Quaker parents, he was sent to the Friends' School in Providence, R. I., afterward to a

seminary near Boston, thence to the United States Naval Academy at Annapolis, but followed his natural bent towards science and became assistant curator of zoology in the American Museum of Natural History, New York City (1871-75). He spent some time collecting specimens for the Aquarium at New York City and was lecturer in the city schools as well as a writer upon scientific subjects for young people. He removed to California and was made trustee and professor of zoology in Throop University. His publications include: *Marvels of Animal Life* (1880); *Elements of Zoology* (1885); *Living Lights* (1887); *The Ivory King* (1886); *A Frozen Dragon* (1888); *A Strange Company* (1889); *Around Pasadena* (1889); *The Pasadena Highlands* (1889); *Santa Catalina Island: Its Sports* (1889); *Louis Agassiz: His Life* (1892); *Charles Darwin's Life and Work* (1893); *The Treasure Divers* (1898); *Stories of Animal Life* (1900); *Half Hours with Nature* (5 vols., 1901); *The Boy Anglers* (1904); *Half Hours with the Lower Animals* (1905); *Life in the Open* (1906); *Log of a Sea Angler* (1906); *Big Game at Sea* (1908); *The Marooners* (1909); *The Channel Islands* (1910); *Distinguished American Scientists* (1911); *Game Fishes of the World* (1913); *The Ocean* (1914); *Angling Adventures around the World* (1914).

HÖLDER, hēl'dēr, EDUARD OTTO (1847-1911). A German jurist, especially versed in Roman law. Born at Stuttgart, he studied at Tübingen and became professor at Zurich (1872), Greifswald (1874), Erlangen (1880), and professor of Roman law at Leipzig (1893). His works include: *Institutionen des römischen Rechtes* (3d ed., 1893); *Zum allgemeinen Teil des Entwurfs eines deutschen bürgerlichen Gesetzbuchs* (1888); *Pandekten* (1886-91); *Ueber objektives und subjektives Recht* (1893); *Die Stellung des römischen Erben* (1895); *Naturliche und juristische Personen* (1905). With Schollmeyer and others, he undertook the preparation of the *Kommentar zum deutschen bürgerlichen Gesetzbuch* (1900).

HÖLDERLIN, hēl'dēr-lēn, JOHANN CHRISTIAN FRIEDRICH (1770-1843). A German poet, born at Lauffen and educated at Tübingen, where he knew Hegel and Schelling. He was an ardent admirer of Schiller, who secured him a tutorship in the house of his friend, Charlotte von Kalb (1793-94). Then he became tutor in a banker's family at Frankfurt, where the mother of his young charges, Frau Gontard, inspired him with a Platonic passion, which led him to celebrate her under the name of Diotima in his *Hyperion*. But from this time on his mind began to fail, and, save for intervals of sanity, he never recovered. His style was classic; his thought, in his best work, deep and full. He wrote: *Hyperion, oder der Eremit in Griechenland*, a novel in epistolary form, but really a prose poem (1797-99); an incomplete drama, *Empedokles*; translations from Sophocles' *Œdipus* and *Antigone* (1804); and the *Lyrische Gedichte*, his best work, mostly elegiac in tone, edited by Uhland and Schwab (4th ed., 1878; in 1899, by Linke). A complete edition of his works, with his letters and biography by Schwab, appeared at Stuttgart (1846). Consult Scherer, *F. Hölderlin Vorträge* (Leipzig, 1874); Müller-Rastatt, *Hölderlin, sein Leben und sein Dichten* (Bremen, 1894); Milbrandt, *Friedrich Hölderlin* (Berlin,

1896); Klein-Hattingen, *Das Liebesleben Hölderlins, Lenaus, Heines* (ib., 1900); Lange, *Holderlin, eine Pathographie* (Stuttgart, 1909).

HOLDERNESS, hōl'dēr-nēs, SIR THOMAS WILLIAM (1849-). An English administrator in India. He was educated at Cheltenham and at University College, Oxford, entered the Indian Civil Service in 1872, was member of the Famine Commission of 1897, acted as Secretary in the Revenue and Agricultural Department in 1898-1901, was Secretary of the Revenue Statistics and Commerce Department of the India Office from 1901 to 1912, and in 1912 became permanent Undersecretary of State in the India Office. In 1907 he was made Knight Commander of the Star of India. He revised Strachey's *India* (1911) and wrote *Narrative of the Indian Famine* (1896-97) and a brief *Peoples and Problems of India* (1912).

HÖLDICH, hōl'dich, SIR THOMAS HUNGERFORD (1843-). An English explorer, born in Dingley, Northampton. He was educated at Woolwich, entered the Royal Engineers, served in the Afghan War in 1878-80 and on frontier expeditions, and in 1884-86 made important additions to our knowledge of Afghan Turkestan when he was on the Afghan Boundary Commission. From 1892 to 1898 he was superintendent of the Indian frontiers survey. In 1899 he was appointed one of three British commissioners on the disputed Patagonian boundary of Chile and Argentina and in 1902 personally surveyed the country, furnishing the data on which the "King's award" was made, and published *The Countries of the King's Award* (1904). He was knighted in 1897. He wrote: *The Indian Borderland* (1901); *India* (1904); *Tibet the Mysterious* (1906); *The Gates of India* (1910).

HOLD'ING (Lat. *tenementum*, a tenement, something held, from *tenere*, to hold). In the feudal law of land tenure, an estate in land held of a superior lord in fee. The term is seldom found in English law except in its Latin form, *tenementum*, which has in English taken on the form of *tenement*. It appears, however, in abbreviated form in the familiar expression "freehold" (*liberum tenementum*). The word has survived in Scots law in its original sense. See also ESTATE; FEE; FREEHOLD; TENEMENT; TENURE.

HOLDREGE, hōl'drēj. A city and the county seat of Phelps Co., Neb., 151 miles west of Lincoln, on the Chicago, Burlington, and Quincy Railroad (Map: Nebraska, E 4). It has a Carnegie library and a fine courthouse. It is a grain centre and distributing point for an agricultural and cattle-raising region. Settled in 1883, it is governed by a mayor, elected annually, and a city council. The water works are owned by the city. Pop., 1900, 3007; 1910, 3030.

HOLE, WILLIAM (1846-). A British painter and etcher, born at Salisbury, England. After serving an apprenticeship as civil engineer, he studied in the school of the Royal Scottish Academy, of which he was elected associate in 1878. He stands highest as etcher, his plates after Millet, Constable, and Velazquez possessing remarkable interpretative merit. His principal paintings are: "End of the '45" (1879); "Prince Charlie's Parliament" (1882); "The Night's Catch" (1883); "The Fill of the Boats" (1885); "The Canterbury Pilgrims" (1889); "The Ascension" (1906). There are mural paintings by him in Edinburgh—in St. James's Church (1896), the National Portrait Gallery

of Scotland (1900), the Municipal Buildings (1903).

HOLGUIN, ol-gēn'. A city of Cuba, in the Province of Santiago de Cuba, and capital of the department of the same name, about 25 miles by rail from Gibara, its port (Map: Cuba, J 6). It has a number of fine buildings. It exports tobacco, timber, corn, and cattle. It was founded in 1720 and received the title of city in 1751. Pop., 1907, 7592.

HOLIBUT. See HALIBUT.

HOLIDAY (AS. *hālg dæg*, holy day). A day set apart as a religious anniversary, or for the purpose of commemorating some extraordinary event, or of honoring the memory of a distinguished person, or for some reason of public policy. As a rule, holidays are occasions for rejoicing. People are expected to observe them "with the voice of joy and praise." (Ps. xlii. 4.) At times, however, they are accompanied by fasts rather than feasts. Of this character are days of humiliation and prayer, such as Fast Day, formerly observed in Massachusetts and other New England States, and days appointed from time to time by proclamation of governmental or ecclesiastical authorities.

During the Middle Ages holidays became so numerous, in many parts of Europe, as to interfere seriously with industrial pursuits. One of the most important results of the religious reformation of the sixteenth century was the abolition of excessive holidays with its consequent increase in the volume of secular labor. A legal holiday is one set apart, either by common or by statute law, as a day of rest, or of cessation in whole or in part from ordinary business activities. Sunday is the only common-law holiday in the United States, although in England Good Friday has been recognized as such for centuries. Legal holidays are of two kinds—general or public, and special or limited. On a public holiday, such as Sunday or the Fourth of July, public offices are closed, and persons under contract to render services cannot lawfully be required to work. In England, and in many of the United States, persons are prohibited from carrying on business or making contracts on Sunday, though there is no general rule prohibiting voluntary labor on other public holidays. (See SUNDAY.) On special or limited holidays, such as some of the bank holidays (q.v.), exemption from labor and from the performance of contracts generally is confined to a particular class of employees or to a designated section of the community, as public officials and employees, bank clerks, etc. As a general rule, negotiable paper falling due on a public or general holiday is not payable until the following day.

There are no national holidays in the United States, although Congress has at various times designated special holidays. Sundays, certain fast days, as Mardi-Gras (Shrove Tuesday) in Alabama, Florida, and Louisiana, and Saturdays after twelve o'clock noon are now legal holidays in all States and Territories where they are so designated by act of legislature. When holidays occur on Sunday, the following day is usually observed. The principal legal holidays in all of the States are as follows: January 1, New Year's Day (except in Arkansas, Massachusetts, and Mississippi); February 22, Washington's Birthday (except in Mississippi); May 30, Decoration, or Memorial,

Day (except in Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Texas); July 4, Independence Day; September, first Monday, Labor Day; November, Election Day, first Tuesday (or Tuesday after the first Monday) in all States holding election, also other days on which elections are held in various States; November, Thanksgiving Day, usually the last Thursday; and December 25, Christmas Day.

In addition to the foregoing the following holidays are commonly observed: January 19, Robert E. Lee's Birthday, in Alabama, Arkansas, Florida, Georgia, Mississippi, North Carolina, South Carolina, and Virginia; February 12, Lincoln's Birthday, in California, Colorado, Connecticut, Delaware, Illinois, Iowa, Indiana, Kansas, Michigan, Minnesota, Montana, Nevada, New Jersey, New York, North Dakota, Oregon, Pennsylvania, South Dakota, Utah, Washington, West Virginia, and Wyoming; variable in date, Good Friday, in Alabama, Connecticut, Delaware, Florida, Louisiana, Maryland, Minnesota, New Jersey, Pennsylvania, Porto Rico, and Tennessee; April 19, Patriots' Day (anniversary of the battle of Lexington), in Maine and Massachusetts; Confederate Memorial Day, April 26, in Alabama, Florida, Georgia, and Mississippi; May 10, in North Carolina and South Carolina; second Friday in May, in Tennessee; June 3, Jefferson Davis's Birthday, in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, South Carolina, Texas, and Virginia; October 12, Columbus Day, in Alabama, Arkansas, California, Colorado, Connecticut, Delaware, Idaho, Illinois, Indiana, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, Rhode Island, Vermont, and Washington.

Also the following special holidays are observed only in the State or Territory mentioned: January 8, anniversary of the battle of New Orleans, in Louisiana; February 12, Georgia Day; March 2, anniversary of Texan Independence, in Texas; March 22, Emancipation Day, in Porto Rico; April 12, Halifax Independence Resolutions, in North Carolina; April 13, Thomas Jefferson's Birthday, in Alabama; April 21, anniversary of the battle of San Jacinto, in Texas; May 20, anniversary of the signing of the Mecklenburg Declaration of Independence, in North Carolina; June 11, Kamehameha Day, in Hawaii; June 15, Pioneer Day, in Idaho; July 10, Admission Day, in Wyoming; July 24, Pioneers' Day, in Utah; July 25, landing of United States troops, in Porto Rico; August 1, Colorado Day; August 16, Bennington Battle Day, in Vermont; September, third Saturday, Regatta Day, in Hawaii; September 9, Admission Day, in California; October 18, Alaska Day; October 31, Admission Day, in Nevada; November 1, All Saints' Day, in Louisiana; November, first Friday, Pioneer Day, in Montana.

Arbor Day and Flag Day (June 14) are frequently celebrated, and in certain cities special days are more or less observed; as, March 4, Inauguration Day, in Washington, D. C.; September 12, Defenders' Day, anniversary of the battle of North Point, in Baltimore, Md.; November 25, Evacuation Day, in New York. Thanksgiving Day, although designated as a holiday by a proclamation by the President of

the United States, is a legal holiday only in the District of Columbia and the Territories. The governors of the States usually designate the same day as the President for Thanksgiving Day, but not always.

In England certain Church festivals, known as "red letter" days (so called because they are printed in red letters in the calendar), are still observed as holidays. They include January 6, Twelfth Day (the evening preceding is Twelfth Night); February 2, Candlemas; February 14, Old Candlemas (St. Valentine's Day); March 25 (formerly April 6), Lady Day; June 24 (formerly July 7), Midsummer Day, or St. John's Day; July 15, St. Swithun's Day; August 1, Lammas Day; September 29, Michaelmas; November 1, Allhallowmas, or All Saints' Day (the evening preceding is Allhalloween); November 2, All Souls' Day; November 11, Martinmas (formerly November 23); and December 28, Childermas. Bank holidays (q.v.) in Great Britain are days designated by act of Parliament on which banks may suspend business.

Bibliography. "Origin of Holidays," *Popular Science Monthly*, vol. xxxiv (New York, 1889); "American Holidays," in *Saturday Review* (London, 1886); "Bank Holidays," in *Journal of the Institute of Bankers* (ib., 1901); "What Should our National Holidays Commemorate?" in *Massachusetts Historical Society* (2d series, Boston, 1902); R. M. McCurdy, *Bibliography of Articles Relating to Holidays* (ib., 1905); Hutton Webster, *Rest Days: A Sociological Study* (Nebraska University Studies, vol. xi, Lincoln, 1911).

HOLINESS, ENTIRE. See **HIGHER LIFE.**

HOLINSHED, or HOLLINGSHEAD, hól'-inz-héd, RAPHAEL (?-1580). An English chronicler. Little is known of his life save that he was of a Cheshire family, probably the son of Ralph Holinshed, of Cophurst, in the township of Sutton Downes. He is celebrated as the author of a history of England, Scotland, and Ireland, which the Elizabethan dramatists drew upon for material in the construction of their historical plays. The work had been started originally by Wolfe, who, however, died in 1573 before its completion. Thereupon Holinshed undertook the work, and in 1577 appeared *Raphael Hollingshed's Cronycle*, in two folio volumes. Holinshed had been assisted by William Harrison, who wrote the historical descriptions of England and Scotland, and by Richard Stanhurst, who contributed a part of the history of Ireland. All copies of the work were printed by Henry Bynnenman. The publishers were George Bishop, John Harrison, and Luke Harrison. A second edition appeared in 1587, after Holinshed's death. This edition was chiefly revised by John Hooker, Abraham Fleming, and Francis Thynne, and contained some passages disagreeable to Elizabeth, who immediately ordered them cut out. A modern edition in six volumes was published in London (1807-08), with the "disagreeable passages" restored. But, after all, Holinshed's *Chronicle*, though popular in its day, would be seldom recalled to-day were it not for Shakespeare's indebtedness to it. From it the data for most of the great historical plays were probably derived; and in *Macbeth*, *Lear*, and *Cymbeline* most of the borrowed action and dialogue can be illustrated by excerpts from Holinshed. Consult: Cooper, *Athenæ Cantabrigienses* (Cam-

bridge, England, 1858); W. G. Boswell-Stone, *Shakespeare's Holinshed* (New York, 1907); C. F. Fiske, *A Study of a Feature of Sixteenth Century Conventionalism as it Reveals itself in Holinshed's Chronicle* (Bloomington, Ill., 1910).

HOLKAR, hōl'kār. The name of a powerful Mahratta family, later adopted as a title by the rulers of Indore, one of the native states of Central India. The founder of the family was Malhār Rao Holkar, who was born in the Deccan in 1694 and, having gained by his valor the favor of the Peshwa (q.v.), obtained from him the western half of Malwa, with Indore for his capital. In 1761 he joined the great league of the princes of Hindustan, formed to bar the progress of Ahmed Shah Durrani, and was present at the battle of Panipat, Jan. 6, 1761; but as he fled shortly after the battle began, he was suspected of treason. Holkar was the only Mahratta chief of note who escaped the slaughter. He died in 1766 and was succeeded by his grandson, Māle Rao, who died the following year. The government then passed to Ahalyā Bai, the mother of Māle Rao, who resigned the military power to Tukoji Rao Holkar. On his death, in 1797, his natural son, Jaswant Rao Holkar, a man able, brave, and unscrupulous, seized Indore, but was driven out by Sindia (q.v.). Such, however, was Holkar's reputation for energy and ability that part of the victorious army deserted to him, with whose aid he obtained a signal victory over Sindia and the Peshwa (October, 1802). After fighting a long time against the British with varying success, he was compelled to conclude peace. He died insane Oct. 20, 1811. His son, Malhar Rao Holkar II, a minor, succeeded, and in 1817 declared war against the British, but his army was totally routed at Mahedpore, December 21; whereupon he sent offers of peace, which were accepted, and an English residency was established at Indore in January, 1818. He died in 1833. Mārtand Rao Holkar, Hari Rao Holkar, and Khande Rao Holkar successively ruled after him. The last of these died without heirs in 1843, and the East India Company assumed the right of nominating Tukoji Rao Holkar, who did not belong to the Holkar family. He was educated under the auspices of the British government and displayed great ability and always remained on the most friendly terms with the British. In 1886 he was succeeded by his oldest son, Sivaji Rao Holkar (died 1908), who ruled until 1903, when he abdicated in favor of his 12-year-old son, Tukoji Rao Holkar, who succeeded with full ruling powers in November, 1911. Consult: J. G. Duff, *A History of the Mahrattas* (3 vols., London, 1826); M. G. Ranade, *Rise of the Maratha Power* (Bombay, 1900); *The Imperial Gazetteer of India* (Oxford, 1907-09).

HOLKAR'S DOMINIONS. See **INDORE**.

HOLL, hōl, FRANK (1845-88). An English portrait and genre painter. He was born in London, the son and grandson of engravers whose profession he at first intended to follow. He entered the Royal Academy schools in 1860, won numerous medals, and was made A.R.A. in 1878 and R.A. in 1883. In 1868 he won the traveling scholarship with "The Lord Gave, and the Lord Hath Taken Away," which, because of its grim pathos and high technical qualities, made his reputation. The blackness of its coloration is perhaps due to his training as an en-

graver. Among other works exhibited at the Royal Academy were: "No Tidings from the Sea" (1871), painted for Queen Victoria; "I Am the Resurrection and the Life" (1872); "Deserted" (1874); "Her First-Born" (1876); "Committed for Trial" (1878); "The Gifts of the Fairies" (1879); "Ordered to the Front" (1880). His portrait of Samuel Cousins, the mezzotint engraver (1878), was hailed as a masterpiece, and immediately Holl was overwhelmed with commissions, the execution of which broke down a constitution never strong. Among the 200 portraits he painted are those of Lord Roberts (1882), for Queen Victoria; the Prince of Wales, Lord Dufferin, the Duke of Cleveland (1885); Lord Overstone, Mr. Bright, Mr. Gladstone, Mr. Chamberlain, and Earl Spencer. Holl's earlier pictures owed part of their striking success to the sombre and melodramatic sentimentality of the stories they told; but his methods as a portrait painter are less open to criticism. Though he sometimes failed to catch a likeness, his work is at best full of strength and decision and ranks him among the foremost men of the English school.

HOLL, KARL (1866-). A German Protestant theologian and Church historian, born and educated in Tübingen. He was licensed in theology in 1890, became an assistant in the Berlin Academy of Sciences in 1894, and lecturer in the University of Berlin in 1896. In 1900 he was made professor at Tübingen and in 1906 professor at Berlin. Among his publications are: *Sacra Parallela des Johannes Damaszenus* (1896); *Enthusiasmus und Bussgehalt beim griechischen Monchthum* (1898); *Amphilochius von Ikonium* (1904); *Die geistliche Uebungen des Ignatius von Loyola* (1905); *Die Rechtfertigungslehre im Lichte der Geschichte des Protestantismus* (1907); *Der Modernismus* (1908); *Calvin* (1909); *Thomas Chalmers und der Anfang der kirchlichsozialen Bewegung* (1913).

HOLLAND, hōl'and. A mediæval county, whose territories now form the provinces of North and South Holland (qq.v.), in the Kingdom of the Netherlands (Map: Netherlands, C 2). The hereditary counts of Holland, whose dominions were included within the limits of the Holy Roman Empire, appear in history as early as the tenth century, but the title Count of Holland was not used until the following century, and the counts owed their importance to the victory won from the Duke of Lorraine in 1018. During the eleventh and twelfth centuries the Dirks and Florises, as all the counts were named, gradually increased their lands and powers. Count William II was elected Roman Emperor in 1247 in opposition to Frederick II. He contested the Imperial crown with Conrad IV, Frederick's successor, and on the death of Conrad in 1254 was recognized by many German princes. He was drowned by breaking through ice while on an expedition against the Frisians in 1256. In 1299 the last lineal descendant of Dirk I died, and Holland passed to the counts of Hainault. Soon after, Zeeland was permanently united with Holland. In 1417 the Countess Jacqueline succeeded to the rule at the age of 17; her husband, the heir to the Kingdom of France, had died only a few months before. From that time she was in constant trouble and was betrayed by husbands and relatives until finally her fourth husband, to whom she seems to have been

strongly attached, was taken prisoner, and in 1433 she made over Hainault, Holland, and Zeeland to Philip the Good of Burgundy, who succeeded in 1436, after her death. Holland shared the fortunes of the united Netherlands and was one of the provinces which achieved their liberation from Spain and constituted themselves into the Dutch Republic. Consult P. J. Blök, *History of the People of the Netherlands* (5 vols., New York, 1898, 1912), and Pouillet, *Histoire politique nationale; origines, développements, et transformations des institutions, etc.* (2d ed., 2 vols., Louvain, 1882-92). See BURGUNDY; NETHERLANDS.

HOLLAND. A city in Ottawa Co., Mich., at the head of Black Lake, which affords a good harbor, having regular steamboat lines to Chicago, and 26 miles southwest of Grand Rapids, on the Pere Marquette Railroad (Map: Michigan, C 6). It is the seat of Hope College, opened in 1865, and of the Western Theological Seminary, both under the control of the Reformed church in America, and has a public library, fine school buildings and city hall, and Jenison and Centennial parks. There are several summer resorts on the shore of Black Lake that enjoy considerable popularity. Holland carries on an extensive grain trade and is a manufacturing centre of importance, its industrial establishments including flour and planing mills, machine shop, tanneries, furniture factories, a beet-sugar factory, a large pickling plant, and manufactories of wood-working machinery, pianos, rucks, and electric and steam launches. The water works and electric-light plant are owned by the municipality. Founded in 1847 by Dutch settlers, Holland was chartered as a city in 1867. Its inhabitants are still largely of Dutch descent. On Oct. 9, 1871, almost the entire city was destroyed by fire, more than 300 buildings being burned down. Pop., 1900, 7790; 1910, 10,490; 1914 (U. S. est.), 11,639.

HOLLAND. A variety of unbleached linen cloth used largely for window shades, being either dyed or coated with a colored dressing. The name is derived from the fact that it was first manufactured in Holland. See LINEN.

HOLLAND, CHARLES (1733-69). An English actor. He was born at Chiswick and in 1755 made his début in *Oroonoko* at Drury Lane, where he played until his death. He was the first to play Florizel in Garrick's alteration of Shakespeare's *The Winter's Tale*. He also appeared in Mrs. Sheridan's *Discovery* (1763), in Garrick and Coleman's *Clandestine Marriage* (1766), in Kendrick's *Widowed Wife* (1767), in Murphy's *Zenobia* (1769), and in Mrs. Griffith's *School for Rakes* (1769). In his final season he played the rôle of Richard III in Garrick's *Jubilee* pageant (1769) and that of Timur in Dow's *Zingis* (1769).

HOLLAND, EDMUND MILTON (1848-1913). An American comedian, born in New York City, the son of George Holland, who was also a well-known actor. He appeared upon the stage in childhood, but his regular professional career began in 1866 at Barnum's Museum. The next year, under the name of Mr. E. Milton, he became a member of Wallack's company, with which he played successfully in *The Road to Ruin*, *Caste*, and other pieces till 1880. After an interval, during which he made a tour in England, he was engaged in 1882 at the Madison Square Theatre. Among his characters in

the years that followed were Pittacus Green in *Hazel Kurke*, Old Rogers in *Esmeralda*, Captain Redwood in *Jim the Penman*, Lot Burden in *Saints and Sinners*, and Colonel Carter in *Colonel Carter of Cartersville*, the last named at Palmer's Theatre. Beginning in 1895, he and his brother Joseph starred for about two years in *A Social Highwayman* and other plays. In 1901-02 he played the title rôle in *Eben Holden*, and from 1903 to 1906 he played Captain Bedford in *Raffles*. In 1909 he joined the New Theatre Company, of which he remained a member till 1911, playing, among other parts, Sir Oliver Surface in *The School for Scandal*, Canon Bonington in *Don*, Mr. Elkin in *The Thunderbolt*, Gaffer Tyl in *The Blue Bird*, and Baron Von Haugh in *Old Heidelberg*. He appeared as Metz in *Years of Discretion* at the Belasco Theatre in 1912. Consult McKay and Wingate, *Famous American Actors of To-Day* (New York, 1896), and L. C. Strang, *Famous Actors of the Day in America* (Boston, 1900).

HOLLAND, SIR HENRY (1788-1873). An English physician, natural philosopher, and author, born at Knutsford, England. He was educated at London and Edinburgh, receiving his medical degree at the University of Edinburgh in 1811. He traveled extensively, practiced medicine from 1815 till his death, was elected fellow of the Royal College of Physicians in 1828, physician in ordinary to the Prince Consort in 1840 and in 1852 to Queen Victoria, was made Baronet in 1853, and was very prominent medically, socially, and in literary circles. He was the author of *Medical Notes and Reflections* (1840); *Chapters on Mental Physiology* (1852); *Essays on Scientific Subjects* (1862); *Recollections of a Past Life* (1871).

HOLLAND, HENRY FOX, first BARON (1705-74). An English politician, the younger son of Sir Stephen Fox, born in Chiswick. He was educated at Eton and at Christ Church, Oxford, and, after a reckless early life, during which time he spent the greater part of his fortune, he entered politics. He was returned to Parliament as a Whig for the borough of Hindon in Wiltshire in 1735, and from 1741 to 1761 he sat for Windsor. In 1737 he was appointed surveyor-general of works by Walpole. After his chief's fall he was Lord of the Treasury (1743) and Secretary of State for War and member of the Privy Council (1746). In 1755 he was bribed by a seat in the cabinet to back George II's measures and quickly became leader of the House. But in 1756 he resigned, and a year later he entered upon the lucrative office of Paymaster-General. Grenville's resignation in 1762 made him again leader of the House of Commons. The task of getting the Peace of Paris approved he accomplished by corruption and browbeating (1763), and for his reward was made Baron Holland, a title which carried with it a seat in the House of Lords. By 1765 he had become so unpopular that he was forced to resign the paymaster-generalship. The Court of Exchequer brought proceedings against him, and the Mayor of London (1769) spoke of him in a petition to George III as "the public defaulter of millions," but he had served the King so well that all attacks were unsuccessful even when he was out of favor at court. Consult T. W. Riker, *Henry Fox, First Lord Holland* (Oxford, 1911).

HOLLAND, HENRY RICH, first EARL OF (1590-1649). An English nobleman, educated

at Emmanuel College, Cambridge, and created Earl in 1610. For Charles, Prince of Wales, he conducted the marriage negotiations with Henrietta Maria in 1624. He became constable of Windsor and high steward to the Queen in 1629, groom of the stole in 1636, and general of the horse in 1639. During Charles's troubles with Parliament Holland three times supported the Parliamentarians, only to desert their cause each time for that of the King. In 1647 he led a force of 800 men in behalf of the royal cause, but was defeated, was captured at St. Neots, and imprisoned at Warwick Castle. He was tried and sentenced to death by the courts and was executed together with Capel and Hamilton, March 9, 1649.

HOLLAND, HENRY RICHARD VASSALL FOX, third BARON (1773-1840). An English politician, only son of Stephen, second Lord Holland, and nephew of Charles James Fox. He was born at Winterslow House, Wiltshire, and was educated at Eton, at Christ Church, Oxford (M.A., 1792), and by extensive travels on the Continent. He entered the House of Lords in 1796 and won especial fame by his protests, later collected by Moylan, *The Opinions of Lord Holland, 1797-1840* (1841). He was soon recognized as a power in the Whig party and fought against suspension of the Habeas Corpus Act, against the union with Ireland, and for the repeal of the Test and Corporation Acts. He was a commissioner (1806) to negotiate a treaty with America. When his uncle died, he was a member of the Privy Council and was a member of the cabinet of 1806 as Lord Privy Seal. When his party was restored to power in 1830, he became Chancellor of the Duchy of Lancaster, and except for two short intervals he held this post until his death. He is perhaps most widely known as the host of Holland House and the centre with Lady Holland of the brilliant company that gathered there. Besides his *History of the Whig Party during my Time*, edited by his son (1852), he wrote *Some Account of the Life and Writings of Lope Felix de Vega Carpio* (1806) and *Inquiry into the State of the Nation, at the Commencement of the Present Administration* (3d ed., 1806). His *Foreign Reminiscences* (1850) gives vivid pictures of his times. His *Further Memoirs of the Whig Party* (1807-21) was published in 1905.

HOLLAND, HENRY SCOTT (1847-). An English preacher and theologian, born at Ledbury in Herefordshire. He was educated at Eton and at Balliol College, Oxford, was made canon (1884) and precentor (1886) of St. Paul's Cathedral, London; and in 1910 he became regius professor of divinity at Oxford and canon of Christ Church. His publications include several volumes of sermons, such as *Logic and Life* (1882); also *Personal Studies* (1905); *Vital Values* (1906); *Fibres of Faith* (1910); *Unity in Diversity* (1914).

HOLLAND, JOHN PHILIP (1844-1914). An American inventor. He was born at Liscannor, County Clare, Ireland, and was educated at the Christian Brothers' school, Limerick. For 15 years he was a school teacher, including, after removal to America, five years at Paterson, N. J. His interest in Irish independence led him to investigate means of breaking up England's sea power, and for this purpose he directed his attention to the construction of submarine torpedo boats. He laid his first plans

for a submarine before the United States Navy Department in 1875, and two years later constructed his first vessel of the sort, a clumsy wooden affair. In 1893 he received his first contract from the United States government, but because of others' interference the boat when constructed was practically a failure. Joining the Crescent Shipyards at Elizabeth, N. J., he built, according to his own plans, the submarine *Holland*, which was successfully tried in 1898 and then purchased by the United States. See **TORPEDO BOAT, SUBMARINE**. Holland died in poverty.

HOLLAND, JOSIAH GILBERT (1819-81). An American journalist and author, born at Belchertown, Mass., July 24, 1819. He graduated at Berkshire Medical College, Pittsfield, Mass., in 1844, practiced medicine three years, was made school superintendent at Vicksburg, Miss., became assistant editor of the *Springfield Republican* (1849-66), and made that journal attain great influence in New England. Here he published his *History of Western Massachusetts* (1855) and during these years gained distinction as a popular lecturer. On his return from two years in Europe (1868-70) he founded *Scribner's Monthly*, which absorbed successively *Hours at Home*, *Putnam's Magazine*, and *Old and New*, and, under changed ownership, is the present *Century Magazine*. Of this he remained editor till his death in New York, Oct. 12, 1881. Of his many volumes of fiction and verse, the earlier were published under the assumed name of Timothy Titcomb. The more noteworthy of the novels are: *The Bay Path* (1857); *Miss Gilbert's Career* (1860); *Arthur Bonnicastle* (1873); *The Story of Seven Oaks* (1875); *Nicholas Minturn* (1877). Of the poems the most popular are: *Bittersweet* (1858); *Katharina* (1867); *Garnered Sheaves* (1873). Noteworthy also are: *Letters to Young People* (1858); *Letters to the Joneses* (1863); *Plain Talk on Familiar Subjects* (1865); *Life of Lincoln* (1865); *The Mistress of the Manse* (1874). A collected edition of his works (16 vols., New York) appeared in 1897-1911. His prose and verse are alike clean in diction and thought, pure and sweet in feeling, earnest in moral tone, and appeal to a wide circle of readers. For his life, consult H. M. Plunkett, *J. G. Holland* (New York, 1894).

HOLLAND, NORTH. See **NORTH HOLLAND**.

HOLLAND, PHILEMON (1552-1637). A native of Chelmsford, England, called by his contemporaries "the translator general of his age." He was educated at Trinity College, of which he became a fellow. On being appointed to the rectorship of the free grammar school of Coventry he began a long series of translations from the classics. He also found time to carry on practice as a physician. By distribution of his time he reconciled his three professions of schoolmaster, doctor, and translator, fulfilling the functions of all three till his eightieth year. His chief translations are those of Livy (entire), Pliny's *Natural History*, Plutarch's *Morals*, Suetonius, Ammianus Marcellinus, and the *Cyropædia* of Xenophon. He also did good service to literature by his edition and translation of Camden's *Britannica*, to which he made some valuable additions.

HOLLAND, THOMAS ERSKINE (1835-). An English authority on international law. He was born at Brighton, studied there and at Balliol and Magdalen colleges, Oxford, where he won

high honors, and entered law practice in 1863. In 1874 Holland became Vinerian reader in English law at Oxford and immediately afterward was appointed Chichele professor of international law and diplomacy, which post he held until 1910. Holland was given the degree of D.C.L. by Oxford and that of LL.D. by Bologna, Glasgow, Brussels, and Dublin, and received numerous other honors. In 1913 he was president of the Institute of International Law. His best-known work, *Elements of Jurisprudence* (1880; 11th ed., 1910), is a standard in England and America. He also wrote: *The Institutes of Justinian* (1873-81); *The European Concert in the Eastern Question* (1885); *Studies in International Law* (1898); *Neutral Duties in a Maritime War as Illustrated by Recent Events* (1905); *The Law of War on Land* (1908); *Proposed Changes in the Law of Prize* (1911).

HOLLAND, WILLIAM J. (ACOB) (1848-). An American zoölogist and paleontologist, born at Bethany, Jamaica, West Indies. He graduated from the Moravian College and Theological Seminary at Bethlehem, Pa., in 1867, from Amherst College in 1869, and from Princeton Theological Seminary in 1874. He was principal of high schools in Massachusetts (1869-71), was ordained to the Moravian ministry in 1872, held pastorates at Philadelphia (1872-74) and at Pittsburgh, Pa. (1874-91), and was chancellor of the Western University of Pennsylvania (now the University of Pittsburgh) from 1891 to 1901. In 1898 he became director of the Carnegie Institute at Pittsburgh, where he had been professor and lecturer since 1892. In 1907-09 he served as president of the American Association of Museums. His publications include *The Butterfly Book* (1898), *The Moth Book* (1903), *To the River Platte and Back* (1913), and papers on the Tertiary fauna and Jurassic dinosaurs.

HOLLAND, WILLIAM OF. See **WILLIAM OF HOLLAND**.

HOLLÄNDER, BERNARD (1864-). An English physician. He was born in Vienna, went to London in 1883, became a British subject, studied medicine at King's College Hospital and on the Continent, and practiced in London. His particular interest in abnormal psychology led him to study cerebral localization and to attempt a modern scientific phrenology. He wrote: *The Mental Functions of the Brain* (1901); *Scientific Phrenology* (1902); *Crime and Responsibility* (1907); *Psycho-Therapeutics of Insanity* (1908); *The Unknown Life and Works of Dr. Francis Joseph Gall* (1909); *Eugenics and Marriage* (1912); *The Insanity of Genius* (1913).

HOLLÄNDER, GUSTAV (1855-1915). A German violinist and teacher, born at Leobschütz (Upper Silesia). He received his first instruction from his father, a physician and most enthusiastic music lover, and even as a child played in public. In 1867-69 he studied under David at the Leipzig Conservatory, from 1869 to 1874 under Joachim at the Hochschule in Berlin and at the same time composition under Kiel. Immediately upon the completion of his studies he joined the orchestra of the Royal Opera in Berlin and was appointed teacher of violin in Kullak's academy. In 1881 he was called to Cologne as concert master of the Gürzenich Orchestra and professor at the

conservatory. A few years later he also succeeded Japha as first violin of the famous Professoren Streichquartett. In 1895 he went again to Berlin to assume the directorship of the Stern Conservatory. He made many successful concert tours of Germany, Austria, Holland, and Belgium. In the field of composition he confined himself to works for his own instrument.

HOLLANDER, JACOB HARRY (1871-). An American economist, born in Baltimore. He graduated from Johns Hopkins University in 1891. He was appointed secretary to the Bi-metallic Commission of 1897; in 1900 the Secretary of War made him special commissioner on the revision of law in Porto Rico, and a few months afterward he was named Treasurer of the island by President McKinley. At Johns Hopkins he served as associate professor of finance until 1900, and as associate professor of political economy from 1901 to 1904, when he was appointed professor. In 1908 he was special commissioner to Santo Domingo to investigate the public debt, and after 1908 he was financial adviser of that Republic. His publications include: *The Cincinnati Southern Railway: A Study in Municipal Activity* (1894); *The Financial History of Baltimore* (1899); *Studies in State Taxation* (1900); *Report on the Debt of Santo Domingo* (1906); *David Ricardo: A Centenary Estimate* (1910). He edited the *Letters of David Ricardo to J. R. McCulloch* (1895) and to *Hutches Trower* (1899).

HOLLAND (höl'and) HOUSE. A London mansion of Tudor architecture, on a hill near Kensington Gardens, built in 1607 for Sir Walter Cope. Its name is derived from an early owner, Henry Rich, Earl of Holland. The house is famous for its associations with the names of those who have occupied it. After Lord Holland's execution it passed into the hands of the Parliamentary generals Fairfax and Lambert, but was later restored to Lady Holland. Addison lived in it from 1716 to his death in 1719. Henry Fox, father of Charles James Fox, purchased it in 1762, and it is still in the possession of his line. Among its other inmates have been Cromwell, Ireton, William Penn, William III and Mary, Moore, and Macaulay.

HOLLAND PURCHASE. See **NEW YORK**.

HOLLAND SOCIETY. A genealogical society, founded in New York City on April 6, 1885. Its objects are to collect information respecting the early history and settlement of New Amsterdam by the Dutch and to discover and preserve all existing documents, mementos, etc., relating to their genealogy and history, as well as to publish material for a memorial history of the Dutch in America, in which shall be particularly set forth the part belonging to that element in the growth and development of American character, institutions, and progress. The society admits to membership descendants, in the male line only, of Dutchmen, or of persons entitled to the privileges of Dutch citizenship in Dutch settlements in America, prior to the year 1675. The badge is a facsimile of the famous Beggars medal of 1566. The society has marked various historical localities in New York City by inscribed plates and publishes a yearbook containing historical and genealogical information. Its membership in 1914 was 1000, with a waiting list, being limited to that number.

HOLLAR, höll'är, WENCESLAUS (in Bohe-

mian, VACLAV HOLLAR) (1607-77). A celebrated Bohemian etcher. He was born at Prague, June 13, 1607, the son of a lawyer, and received a good education. When quite young, he took up the study of drawing, modeling his work especially on that of Dürer. He was only 18 when he published his first works, consisting of the "Virgin" (after Dürer), the "Ecce Homo," and some other subjects. Leaving Prague, he began a wandering life through Germany, taking views of the chief towns and of the most striking scenery of the Danube, Rhine, and other streams. He lived two years at Frankfort, where he worked under Matthew Marian, a pupil of Rubens and Van Dyck, and afterward in Strassburg and Cologne. At Cologne in 1635 he fell in with the Earl of Arundel, the English Ambassador to the German Emperor, who attached him to his service. Soon after reaching England with his patron he was appointed to instruct the Prince of Wales in drawing and in 1640 published his *Ornatus Muliebris Anglicanus*, a description of the customs of the contemporary Englishwomen, followed in 1643 by *Theatrum Mulierum*, a similar production for the women of the remaining parts of Europe. During the Civil War he enlisted as a Royalist and took part, with other artists, in the defense of Basing House. In 1645 he joined Lord Arundel at Antwerp. He was simple and honest in money matters, and nearly always the victim of unscrupulous dealers. After Arundel's death he became very poor. He worked by time, fixing his tariff at fourpence an hour, which he marked by a sandglass. During this period, however, he produced his best work. He returned to England in 1652 and worked with the same unflagging industry and with no more profitable result. His plates in Dugdale's *Monasticon* and *History of St. Paul's* and in other works attest his diligence. After the Restoration he was made designer to the King, and in 1669 he was commissioned by Charles II to take plans and perspective drawings of Tangier and its fortifications, in payment for which work he received a very paltry sum. In 1673 he traveled through northern England, etching the principal cities there. He died in great poverty in London, Jan. 19, 1677.

He left some 2750 plates on a great variety of subjects. They include views of cities, such as Strassburg, Frankfort, Cologne, Greenwich, Oxford, Lincoln, York, Albury, Windsor, Tangier, etc.; architectural drawings, for example of Antwerp Cathedral, St. George's Chapel (Windsor), tomb of Edward IV (Windsor); and other subjects: "Trial of Archbishop Laud," "Coronation of Charles II," "Engagement with the Algerian Pirates," the "Four Seasons." His portraits were especially after Holbein and Van Dyck. Among the best known are those of Charles I and his Queen after the latter, and his original engravings of the Duke of York (afterward James II), Oliver Cromwell, Hobbes, and Lady Venetia Digby. While most of his work was original, he executed with equal facility engravings after the old masters. Some of the best known are an "Ecce Homo," after Titian; "Esther before Ahasuerus," after Veronese; "Cupid Riding a Lion," after Giulio Romano; and especially a beautiful goblet after Mantegna's pen drawing. There are almost complete collections of his works in the British Museum and in the library of Windsor Castle.

Hollar's work unites, in a remarkable fashion,

accuracy and the pictorial quality. He is known chiefly as a topographical and architectural engraver, and even into such subjects he knows how to introduce poetry and romance. His portraits are admirable, his landscapes dainty and free. Catalogues of Hollar's plates were edited by Vertue (London, 1759) and by Parthey (Berlin, 1853; supplement, 1858; additions by Borowsky, Prague, 1898). The former contains valuable biographical notices; the latter is an excellent and exhaustive treatise.

HOLLAZ, hól'läts, DAVID (1648-1713). A German dogmatic theologian, born at Wulkow in Pomerania. He studied at Erfurt and Wittenberg, became preacher at Pützerlin in 1670, assistant rector at Stargard in 1681, and afterward was situated at Kolberg and at Jakobs-hagen. His great work, *Examen Theologicum Acroamaticum Universam Theologiam Thetico-polemicam Complectens* (1707), passed through many editions and surpassed preceding works in clearness and simplicity rather than scientific knowledge. It may be considered the best expression of Lutheran orthodoxy of the period. He is not to be confused with David Hollaz, his grandson, who preached at Günthersberg and was the author of *Beschreibung der Wiedergeburt* (1737), *Anweisung zum Gebet* (1747), *Evangelische Gnadenordnung* (1751), and *Pilgerstrasse nach Zion* (1771).

HOLLEBEN, hól'la'b'en, THEODOR VON (1838-1913). A German diplomat. He was born in Stettin and was educated at Berlin, Heidelberg, and Göttingen. After serving in the Franco-Prussian War he left the Hussars for the diplomatic service in 1872. He was Minister to Argentina (1875-85); Envoy to Japan (1885-91), to Washington (1892-93), to Stuttgart (1893-97), and then again to Washington, where he received the rank of Ambassador (1897). After the failure of the German effort to induce President Roosevelt to act as arbitrator in the Venezuelan dispute, Von Holleben resigned (1903), his health having failed.

HOLLES, hól'iz, or hólz, DENZIL, LORD (1599-1680). An English statesman, born at Haughton, Nottinghamshire, Oct. 31, 1599. He was a member of Parliament for St. Michael, Cornwall, in 1624, for Dorchester in 1628, and in 1629 was one of two members who forced the Speaker to keep his seat when he strove to obey Charles I by adjourning the House before it could pass certain acts upon taxation and religion obnoxious to the King. Holles was fined and imprisoned in the Tower for nearly a year. He again represented Dorchester in Parliament in 1640. Two years afterward he was one of the famous five members whom King Charles tried unsuccessfully to arrest, and while the civil war was in progress held Bristol for the Parliament and raised a regiment of foot that made its mark at Edgehill and Brentford. But, his war spirit having abated, he was one of the commissioners appointed to treat with the King both at Oxford and at Newport. When he proposed the disbandment of the army in 1647, its leaders accused him of high treason, and he was once again obliged to seek an asylum on the Continent and remained in France until the close of the Protectorate. He was one of those who conferred with Monk regarding the proposed Restoration and again took his seat in Parliament in February, 1660. He was ever watchful that Charles II did not encroach upon the public liberties, dearer to him than the

King who had made him a peer (1661) and in whose Privy Council he sat (1679), and he exercised his great influence towards the disbanding of the army, lest the restored monarch should attempt to use it for his own purposes. Lord Holles was one of the commissioners of the Treaty of Breda (1667). He wrote: *The Grand Question Concerning the Judicature of the House of Peers* (1669); *The Case Stated Concerning the Judicature of the House of Peers in the Point of Appeals* (1675); *The Case Stated of the Jurisdiction of the House of Lords in the Point of Impositions* (1676); *Considerations Touching that Question whether the Prelates have the Right to Sit among the Lords and Vote with them in Parliament in Capital Cases* (1682).

HOLLEY, ALEXANDER LYMAN (1832-82). An American metallurgist and mechanical engineer, born at Lakeville, Conn., where his father, Alexander H. Holley, later Governor of the State, had a cutlery factory, in which the boy became an adept as a machinist. He took a scientific course at Brown University (1850-53). In 1854 he became editor and partner with Zerah Colburn of the *Railroad Advocate*. Four years later he and Colburn wrote *The Permanent Way and Coal-Burning Locomotive Boilers of European Railways*, which did much to reform American railroad management. He was an editor of the *New York Times* and of Webster's *Dictionary*, traveled in Europe in 1862, and wrote a *Treatise on Ordnance and Armor* (1864). In 1863 he went to England, purchased the Bessemer patents, and in 1865 started the Bessemer plant at Troy, which, later, he greatly improved. (See **IRON AND STEEL**, *Bessemer Process*.) He was closely connected with the building of many large steel works. He was trustee of the Rensselaer Polytechnic Institute (1865-82) and in 1875 became president of the Institute of Mining Engineers and a member of the government board for testing structural materials.

HOLLEY, MARIETTA (1850-). An American author, born near Adams, Jefferson Co., N. Y. She began by writing poetry for the country press at the age of 16. Her prose contributions to periodicals giving the amusing adventures of "Samantha," and the sayings and doings of "Josiah Allen's Wife," proved very popular. Her books include: *Samantha at the Centennial* (1877); *My Wayward Partner* (1880); *Miss Richard's Boy* (1883); *Samantha at Saratoga* (1887); *Samantha amongst the Colored Folks* (1892); *Samantha in Europe* (1895); *Around the World with Josiah Allen's Wife* (1899); *Samantha at the St. Louis Exposition* (1904); *Samantha on the Woman Question* (1913); *Josiah Allen on the Woman Question* (1914).

HOLLEY, MYRON (1779-1841). An American reformer and editor, born in Salisbury, Conn. A graduate of Williams College, he began the practice of law in 1802, but left it for a bookselling business in Canandaigua, N. Y., and was a leading promoter of the Erie Canal. Afterward he was prominent in the Antimasonic and the antislavery movements. He was editor first of the *Countryman* (1831-34), then of the *Hartford Free Elector* and of the *Rochester Freeman*.

HOLLICK, CHARLES ARTHUR (1857-). An American geologist, born on Staten Island, N. Y. He graduated from the Columbia School

of Mines in 1879 and as Ph.D. from Columbian (now George Washington) University in 1897. He served as president of the Port Richmond (N. Y.) boulevard commission (1896), and of the Richmond County (N. Y.) park commission (1897-1904), and as member of the New York City Board of Education (1907-10), from 1891 to 1900 taught geology at Columbia University, and thereafter was curator of the department of fossil botany of the New York Botanical Garden. In 1881 he joined the United States Geological Survey, of which he became geologist. His writings deal with the fossil botany and geology of the eastern United States. He became a contributor to the *NEW INTERNATIONAL ENCYCLOPEDIA*.

HOLLIDAYSBURG. A borough and the county seat of Blair Co., Pa., on the Juniata River, 7 miles south of Altoona, on branches of the Pennsylvania Railroad (Map: Pennsylvania, E 6). Coal, iron ore, ganister, and limestone are found in the vicinity; and the borough has foundries and machine shops, a silk mill, car works and classification yards. The borough owns its water works. On the outskirts of Hollidaysburg are the Ant Hill Woods, famous for their colony of ants. Pop., 1900, 2998; 1910, 3734.

HOLLINS, ALFRED (1865-). An English musician, born at Hull. He was blind from his birth and at nine years of age entered the Wilberforce Institution for the Blind at York, where he remained three years, studying music under William Barnby. In 1878 he entered the Royal Normal College for the Blind at Upper Norwood, making the piano his chief study, his teacher being Fritz Hartvigson. Through the kindness of the principal of the institution he secured organ lessons from E. J. Hopkins, who took a special interest in him, and who helped him considerably in the mastery of orchestration, which was later a conspicuous feature of his compositions. At the age of 16 he had given recitals before the courts of England and Germany and was a special favorite with Queen Victoria and the Empress Frederick of Germany. In furtherance of his equipment as a pianist he studied piano with Von Bülow in Berlin and in 1887 became a pupil at the Raff Conservatory, studying in addition under Max Schwartz. He visited America twice—in 1886 as a member of Dr. Campbell's party and in 1888 as a concert organist. His most important engagement was as organist of United Free St. George's Church, Edinburgh. His organ compositions are universally known and are very popular in the United States. The following are among his better-known works: two concert overtures (in C major and C minor); andante in D; grand *chœur* in G minor; two preludes; intermezzo in D flat; and a nocturne in B flat.

HOLLINS, GEORGE NICHOLS (1799-1878). An American naval officer. A native of Baltimore, Md., he was midshipman at the age of 15, and, being aboard a frigate taken by the English, he was held a prisoner by them till the end of the War of 1812. Ten years later he had exchanged the naval for the merchant service, and by 1844 was captain of an armed vessel which he subsequently employed to enforce the rights of Americans living in Nicaragua, thereby causing international complications with Great Britain. This was in 1855. At the outbreak of the Civil War he sided with the Confederates

and as a commodore in their navy rendered important service.

HOLLIS, HENRY FRENCH (1869-). An American legislator. He was born in Concord, N. H., and graduated from Harvard University in 1892. In the following year he took up the practice of law at Concord. He became a member of the Democratic State Central Committee in 1900 and was Democratic candidate for Congress in 1900 and for Governor in 1902 and 1904. He was elected United States Senator from New Hampshire for the term 1913-19.

HOLLIS, IRA NELSON (1856-). An American marine engineer and educator, born at Mooresville, Ind. He graduated from the United States Naval Academy in 1878, rose to the rank of assistant engineer in the United States navy in 1888, but resigned in 1893. Thereafter until 1913 he was professor of engineering at Harvard University, and in the latter year he became president of Worcester Polytechnic Institute. He received the honorary degrees of A.M. from Harvard in 1899, L.H.D. from Union College in 1899, and Sc.D from the University of Pittsburgh in 1912. Besides contributions to engineering magazines, he is author of *War College Lectures on Naval Ships* (1892) and a history of *The Frigate Constitution* (1900).

HOLLISTER. A town and the county seat of San Benito Co., Cal., 94 miles southeast of San Francisco, on the Southern Pacific Railroad (Map: California, D 6). It is the centre of farming, fruit-growing, dairying, and stock-raising interests. The town has a hospital and a Carnegie library. Quicksilver is found in the vicinity. Pop., 1900, 1315; 1910, 2308.

HOLLISTER, GIDEON HIRAM (1817-81). An American author, born in Washington, Conn. After graduating at Yale (1840), he studied and practiced law in Litchfield, with digressions to other towns in Connecticut and with a year in Haiti as United States Minister (1868-69). In 1880 he was sent to Congress. His literary work consists of an historical novel, *Mount Hope* (1851), *History of Connecticut* (2 vols., 1854), *Thomas à Becket: A Tragedy, and Other Poems* (1866), and *Kinley Hollow* (1882), published posthumously.

HOLLMANN, hól'mán, FRIEDRICH (1842-1913). A German admiral, born in Berlin. He entered the Prussian navy in 1857, served in the Asiatic expedition of 1859-62, commanded a gunboat in 1864, and, after service on schoolship and at the Kiel Naval Academy, fought at the battle of Grille in the Franco-Prussian War. His advance was rapid; in 1889 he arranged the trip of the German Emperor and Empress to Greece and Turkey; and in the following year he was made Secretary of State for the Navy—a post which he held until June, 1897, when he resigned because of his inability to pass the naval budget. He had been promoted to admiral in 1896. Since 1904 he had been a member of the Prussian House of Lords.

HOLLMANN, JOSEF (1852-). A Dutch violoncellist, born at Maestricht. After having been prepared in his native town by Keller, he entered the Brussels Conservatory, where he studied the cello with Servais and composition with Fétis. Although he left the institution as winner of the first prize, he went to Paris for further study under Jaquard and Savart. His first tour of Scandinavia established his reputation, which grew steadily on his subsequent tours

of Germany, the Netherlands, France, and England. Twice he visited the United States, in 1892 and 1906, both times with most gratifying results. His playing is characterized by a fiery energy artistically restrained, and an extremely beautiful tone of great power and mellowness. He published a number of compositions for his instrument.

HOLLOWAY, JOSEPHUS FLAVIUS (1825-96). An American mechanical engineer, born at Uniontown, Ohio. From 1865 to 1872 he was superintendent and engineer and thereafter, until 1886, president of the Cuyahoga (Ohio) Steam Furnace Company, manufacturers of locomotive and marine engines. He then became consulting engineer of the H. R. Worthington firm of New York City, and in 1895 took up the same duties with the Snow Steam Pump Works of Buffalo. He patented several improvements in marine engines and in pumping machinery. In 1885 he served as president of the American Society of Mechanical Engineers.

HOLLOWAY, LAURA CARTER (afterward MRS. LANGFORD) (1848-). An American author, twice married, whose maiden name was Carter. She was born in Nashville, Tenn., and was educated at the Female Academy there. For 12 years she was associate editor of the Brooklyn *Daily Eagle*. She was president of the Seidl Musical Society in Brooklyn and a collaborator with Anton Seidl himself in the musical work for the *Standard Dictionary*. She published: *Ladies of the White House* (1870); *An Hour with Charlotte Brontë* (1883); *The Mothers of Great Men and Women* (1884); *Chinese Gordon* (1885); *Adelaide Neilson: A Biography* (1885); *The Buddhist Diet Book* (1887); *Atma Fairy Stories* (1903).

HOLLOWAY COLLEGE, THE ROYAL. An institution founded in 1883 at Mount Lee, Egham, Surrey, England, by Thomas Holloway, for the purpose of supplying higher education to women, particularly of the middle class. The building is very handsome, in the French Renaissance style, and was opened by Queen Victoria in 1886. Seventeen governors look after the management. Accommodation is provided for some 200 students, who are prepared for the examinations of the University of London in the faculties of arts and science.

HOLLOW WARE. There are two classes of iron goods so called, viz., cast-iron hollow ware and wrought-iron hollow ware. Both kinds include cooking and other vessels for domestic use, which have in large part displaced earthenware, and comprise also some other articles, such as coffee mills, which are molded and finished in a similar way. Wrought-iron hollow ware is largely made by the process of stamping (see DIES AND DIE SINKING), though it may be forged, drawn, or planed. Hollow ware is finished in three ways; some of it is enameled, some tinned, and some of it is left black, or untinned. See ENAMEL.

HOLLS, hólz, GEORGE FREDERICK WILLIAM (1857-1903). An American lawyer. He was born at Zelenople, Pa., graduated at Columbia (1878) and at Columbia Law School (1880), and gained a large German-American practice in New York City. He was a Republican delegate at large to the State Constitutional Convention in 1894 and was commissioner on government of cities of the third class (1895). During the Spanish-American War he did much in Germany to better feeling towards the United States and

in the following year was appointed secretary and counsel of the American delegation to the Peace Conference at The Hague. In the treaty there concluded Holls wrote the article "Special Mediation." He wrote: *Franz Lieber* (1884, in German); *Sancta Sophia and Troitza* (1888), a sketch of travel in Russia and the East; *Compulsory Voting* (1891); *The Peace Conference at The Hague and its Bearings on International Law and Polity* (1900).

HOLLY (older *hollen*, from AS. *holen*; connected with Ir. *cuilenn*, Gael. *cuiloun*, Welsh, *celyn*, holly, and also with OHG. *hulis*, huls, Ger. *Hülse*, holly, Skt. *śala*, staff). *Ilex*. A genus of trees and shrubs of the family Aquifoliaceæ, chiefly natives of temperate climates, with evergreen, leathery, shining, and generally spinous leaves. The common holly (*Ilex aquifolium*), the only European species, and a native also of some parts of Asia, is a well-known ornament of parks and shrubberies in Great Britain, where it sometimes attains a height of 50 feet upon suitably light soils. Numerous varieties of holly are in cultivation, which exhibit great diversity in the leaves. The flowers of the holly are whitish, axillary, nearly umbellate; the fruit small, scarlet, rarely yellow or white. Medicinal properties are attributed to the leaves, berries, and roots. Birdlime is made from the inner bark. The wood is almost as white as ivory, very hard and fine-grained, and is used by cabinetmakers, turners, musical-instrument makers, etc., and sometimes for wood engraving. The holly is often planted for hedges, since it bears clipping well. The name "holly" is said to be derived from the use of the branches and berries to decorate churches at Christmas, from which the tree was called holy tree. Numerous species of holly are found in North America, most of them in swampy situations; in South America, Nepal, Japan, and other parts of the world. Some of these have been introduced as ornamental trees and shrubs. Maté (q.v.), or Paraguay tea, is the leaf of a South American

furnished the "black drink" of the North Carolina Indians.

HOLLYHOCK (ME. *holihoc*, holy hock, from *holi*, AS. *hālig*, holy + *hoc*, AS. *hoc*, leaf), *Althæa rosea*. A plant of the family Malvaceæ, native of India and south of Europe, etc., and common in gardens throughout the world. It



HOLLYHOCK (*Althæa rosea*).

has a tall, straight, hairy, unbranched stem, 4 to 15 feet tall; heart-shaped, crenate, wrinkled, five to seven angled leaves, which diminish upward into bracts; and large axillary flowers, almost without stalks, which on the upper part of the stem form a spike; the petals are hairy at their bases. Its flowers vary much in color, and double and semidouble varieties are common. It is an ornamental autumnal flower, which continues till frost. It is propagated either by seed or cuttings.

The plant is frequently attacked by a fungus, a rust, *Puccinia malvacearum*, which has greatly reduced its culture in many parts of the United States and Europe. Its presence may be first noticed in May or June by small yellow spots on the leaves and stems. Soon the leaves become dry and dead, as though scorched by fire. Any standard fungicide applied frequently from early spring until flowering time will keep the disease in check. Washing the leaves with a solution of two tablespoonfuls of potassium permanganate in a quart of water is a common remedy employed in Europe. The hollyhock is sometimes attacked by blight (*Colletotrichum malvarum*), and a leaf-spot disease (*Cercospora althæina*), both of which may be prevented by the use of some good fungicide (q.v.).

HOLLY SPRINGS. A city and the county seat of Marshall Co., Miss., 45 miles southeast of Memphis, Tenn., on the Kansas City, Memphis, and Birmingham, and the Illinois Central railroads (Map: Mississippi, F 1). It has a public library, Rust University for negroes (Methodist Episcopal), opened in 1868, the Mississippi Synodical College for young ladies, the Holly Springs Normal Institute, and the experiment station of the Mississippi Agricultural and Mechanical College. The city is situated in a fertile stock-raising and dairying region and is principally engaged in the cotton trade and has a cotton compress and gin, a cottonseed-oil mill, bottling works, an ice factory, stone-jug fac-



HOLLY (*Ilex aquifolium*).

species of holly (*Ilex paraguensis*). In the United States there are a dozen species of *Ilex*, the finest of which, American holly (*Ilex opaca*), is a small tree, 20 to 40 feet tall, extensively used as a Christmas decoration, though the leaves are less glossy and the berries not so bright a red as the European species. *Ilex vomitoria* is a shrub which occurs from Virginia southward. Its leaves are used for tea, and it

tories, etc. Holly Springs is governed under a charter of 1896, which provides for a mayor, elected biennially, and a city council. The water works and electric-light plant are owned and operated by the municipality. In December, 1862, during the Civil War, General Grant established here a depot of supplies, protected by a small garrison under Col. R. C. Murphy, preparatory to moving forward against Vicksburg. On December 20 the Confederate General Van Dorn by a rapid movement captured the post, taking about 1500 prisoners, and destroyed supplies valued by Grant at \$400,000. This, together with a raid by Forrest into Tennessee, forced Grant to abandon for a time his forward movement. Pop., 1890, 2246; 1900, 2815; 1910, 2192.

HOLM, hölm, GUSTAV FREDERIK (1849-). A Danish naval officer and Arctic explorer, born at Copenhagen. He was made commander in the navy in 1899, was chief of the hydrographic bureau from 1899 to 1909, and became director of pilots in 1912. A member of the Royal Greenland Commission after 1896, he became distinguished for his explorations, which greatly enlarged our knowledge, especially of the east coast of Greenland and of its natives. Among many explorations he investigated archaeologically the Norse ruins of the Julianehaab district. From 1883 to 1885 he explored, with Garde (q.v.), the east coast of Christian IX Land, as far as 86° 8' N. Holm discovered 11 hitherto unknown Eskimo communities, numbering 431 inhabitants, and five great ice floids. As a result, Denmark established a missionary station and commercial post at Angmagsalik, 65° 37' N., thus saving from annihilation the slowly vanishing natives of that coast. For his explorations he received gold medals from the Société de Géographie, Paris (1891), and the Danish Geographical Society (1895), and the Danish Order of Merit (1909). He wrote, with Garde, *Den danske Konebaade-Expedition til Grønlands Østkyst 1883-85* (1887) and *Om de geografiske Forhold i dansk Østgrønland* (1889). Consult *Meddelelser om Grønland*, ii, vi, ix, x, xvi (Copenhagen, 1879).

HOLM, hölm, PETER EDWARD (1833-). A Danish historian, born at Copenhagen. He studied philology at the University of Copenhagen and, after receiving his doctor's degree there, became lecturer in 1865 and from 1868 to 1899 was professor of history. In 1875 he published *Danmark-Norges udenrigske Historie 1791-1807* in two volumes. He planned to write the history of Denmark and Norway from 1720 to 1814 and published as introduction *Danmark-Norges indre Historie, 1660-1720* (2 vols., 1885-86), and up to 1914 seven volumes had appeared of his *Danmark-Norges Historie fra den store nordiske Krigs Afslutning til Rigerens Adskillelse*. This work is monumental in Danish historical writing. Holm's great historical learning and broad culture, his practical administrative knowledge, his good sense and calm estimation of persons and actions, and his strict impartiality to both kingdoms fitted him eminently to be the historian of the period he treats. His *Danmarks Riges Historie* (1903) is an abbreviation of his history of the period 1699-1814. Holm was elected an officer or member of many scientific societies.

HOLM, hōm, SAXE. The nom de plume signed to a series of short stories, first published in *Scribner's Monthly Magazine* and then in a vol-

ume (New York, 1873; 2d series, 1878). They have been attributed to Mrs. H. M. F. Jackson (at the time of publication, Mrs. Helen Hunt).

HOLM, hölm (HERMAN) THEODOR (1854-). An American botanist. He was born at Copenhagen, Denmark, and graduated from the University of Copenhagen in 1880. He was botanist and zoologist of the Danish North Pole Expedition in 1882-83 and made explorations in west Greenland for his government in 1884-86. In 1893, after five years of residence in the United States, he became an American citizen. He served as assistant botanist of the United States National Museum in 1888-93 and of the United States Department of Agriculture in 1893-96, and in 1896-99 he made investigations of the high Alpine flora of Colorado. He is author of several papers on Arctic plants and on the anatomy and morphology of phanerogams. In 1902 he received an honorary Ph.D. from the Catholic University of America.

HOLMAN, höl'man, JOSEPH GEORGE (1764-1817). An English actor and dramatist. Educated in London and at Oxford, he made his début, when 20 years of age, as Romeo at Covent Garden, and continued to present Shakespearian and other rôles there till the end of the eighteenth century. In 1806 he played in Dublin and then at the Haymarket, London. He went in 1812 to America, where he had the support of his daughter in performances at New York City and Philadelphia. He was successful as a writer of comedies and comic operas, such as *Abroad and at Home* (1796), *Red Cross Knights* (1799), *Voluntary of Wealth* (1799), and *What a Blunder* (1800).

HOLMAN, SILAS WHITCOMB (1856-1900). An American physicist, born at Harvard, Mass. He graduated at Massachusetts Institute of Technology in 1876, was appointed an instructor in that institution in 1881, assistant professor in 1882, associate professor in 1885, and professor in 1893. In 1897 ill health and failing eyesight compelled him to retire with the title of professor emeritus. He was particularly interested in the methods of laboratory instruction and published investigations on *The Effect of Temperature on the Viscosity of Air* (1876) and on *The Viscosity of Gases*; and other works, including *Physical Laboratory Notes* (1885-95), *Computation Rules and Logarithms* (1896), and *Matter, Energy, Force, and Work* (1898).

HOLMAN, WILLIAM STEELE (1822-97). An American jurist and politician. He was born in Dearborn Co., Ind., and was educated at Franklin College, became a judge of probate at the age of 21, was elected district attorney of his county in 1846, and in 1851 was sent to the Legislature. With the exception of eight years he was a Democratic Representative in Congress from 1859 till his death, in 1897, and from his opposition to extravagant appropriations was known as "the great objector" and "the watchdog of the Treasury."

HOLMBOE, hölm'bō, CHRISTOPHER ANDREAS (1796-1882). A Norwegian philologist and numismatist, brother of Bernt Michael Holmboe (1795-1850), the mathematician. He was born at Vang, studied at Christiania, and made a specialty of Oriental languages, especially Persian, under De Sacy in Paris (1821-22). In 1822 he became lecturer in Oriental languages at Christiania, and in 1825 professor. Besides being a pioneer in philology, he took an active interest in education. He founded the *Norske Universitets og Skole-Annaler* (1834-40). His more im-

portant works are: *De Re Prisca Monetaria Norvegica* (1841); *Sanskrit og Oldnorsk* (1846); *Det Oldnorske Verbum* (1848); *Det Norske Sprogs væsentligste Ordforraad, sammenlignet med Sanskrit* (1852); *Norsk og Keltisk* (1854); *Bibelsk Real-Ordbok* (1868).

HOLMBY (hōm'bi) **HOUSE**. A mansion near Northampton, England, erected by Sir Christopher Hatton during the reign of Elizabeth and later purchased by James I. It was here that Charles I was imprisoned by the Parliamentary commissioners from the time he was surrendered by the Scots until removed to Newmarket by Cornet Joyce (February–June, 1647). Five years thereafter the house was dismantled. See Gardiner, *History of the Great Civil War*, vol. iii (new ed., London, 1893).

HOLMES, hōmz, ABIEL (1763–1837). An American Congregational clergyman and historian, born at Woodstock, Conn. He graduated at Yale in 1783 and for a time was a tutor and a student of theology there. His first pastorate was at Midway, Ga., in a district settled largely by New Englanders. There he remained from 1785 till 1791. In 1792 he accepted a call to the First Congregational Church of Cambridge, Mass., where he continued during the next 40 years. His first wife was a daughter of President Stiles, of Yale College; his second was the daughter of Oliver Wendell and became the mother of Oliver Wendell Holmes (q.v.). His publications include: *A Life of President Stiles* (1798); *Annals of America* (1805; new ed., 1829, bringing the narrative down to 1826)—his best-known work, characterized by the minutest accuracy and still standard for the period covered; *Historical Sketch of the English Translation of the Bible* (1815); and a number of sermons, addresses, and memoirs.

HOLMÈS, ô'mès', **AUGUSTA MARY ANNE** (1847–1903). A French composer, born in Paris of English-Irish parents. Her father was Capt. Dalkeith Holmes, of the British army, and her mother was a member of an old Hampshire (England) family. She studied under Lambert, Klose, and César Franck, and, although a brilliant pianist (in her childhood regarded as a prodigy), she attained distinction entirely through her compositions. In 1879 she won the third prize with her *Lutèce*, in an open competition instituted by the city of Paris. Her other important compositions are a psalm, *In exitu* (1873); the operas *Héro et Léandre* (1874) and *La montagne noire* (1895); an *Andante pastoral* (1877); the symphonies *Les Argonautes* (1880), *Irlande* (1882), and *Pologne* (1883); and over 100 songs, besides other orchestral works. Two more operas, *Astarte* and *Lancelot du Lac*, she left in manuscript. Consult P. Barillon-Bauché, *Augusta Holmès et la femme compositeur* (Paris, 1913).

HOLMES, hōmz, E(LIAS) **BURTON** (1870–). An American traveler and lecturer. He was born in Chicago, where he was educated at the Allen Academy and at the Harvard School, and where he began his lecture work in 1890. With the exception of Australia, New Zealand, and South Africa, he traveled in nearly every country in the world in gathering material for his lectures; these he delivered in all the leading American cities and in several foreign countries. He is author of *The Burton Holmes Travelogues* (12 vols., 1908).

HOLMES, GEORGE FREDERICK (1820–97). An American educator. He was born in British

Guiana, was educated at Durham University, England, came to America in 1838, and taught in Virginia, South Carolina, and Georgia. He was for a time one of the editors of the *Southern Quarterly Review* and in 1846 became first president of the University of Mississippi. From 1847 to 1857 he was professor of history, political economy, and international law in William and Mary College. From that time until his death he was professor of history and literature in the University of Virginia. He prepared a series of textbooks for the use of schools in the Southern States, in which the sentiments and selections were made with reference to the justification of slavery.

HOLMES, JOHN HAYNES (1879–). An American Unitarian clergyman, born in Philadelphia. He graduated from Harvard University in 1902 and from Harvard Divinity School in 1904. He then became minister of the Third Religious Society (Unitarian) of Dorchester, Mass., and in 1907 he succeeded Minot J. Savage as pastor of the church of the Messiah, New York City. From 1908 to 1911, as president of the Unitarian Fellowship for Social Justice, he was especially active in urging reforms. He became associate editor of *Unity*, Chicago, and of the *Unitarian Advance*, New York; and is author of *The Revolutionary Function of the Modern Church* (1912) and *Marriage and Divorce* (1913).

HOLMES, JOSEPH AUSTIN (1859–1915). An American geologist, born at Laurens, S. C. In 1881 he graduated from Cornell University. From 1881 to 1891 he was professor of geology and natural history at the University of North Carolina, where he afterward served as lecturer. He was State geologist of North Carolina from 1891 to 1904; had charge of the United States Geological Survey laboratories for testing fuels and structural materials at St. Louis, Mo., in 1904–07 and at Pittsburgh, Pa., after 1908; investigated mine accidents in 1907–10 for the government; and when the Bureau of Mines was organized under the Department of the Interior (1910), he became its director. In 1904 he was chief of the department of mines and metallurgy at the St. Louis Exposition, and he wrote on mining technology, on mine explosions, and on more efficient and safe methods of mining.

HOLMES, MARY JANE (c.1839–1907). An American novelist. Her maiden name was Hawes, and she was born in Brookfield, Mass., but moved at her marriage to Versailles, Ky., and afterward to Brockport, N. Y. She was at first a district school-teacher, and the didactic tendency is perceptible throughout her works, which were favorites of the young person of a past generation and, indeed, are still current. Her first novel, *Tempest and Sunshine* (1854), a picture of Southern society, was followed by a book almost every year, and the total circulation of her many volumes has exceeded two millions. Mrs. Holmes was a novelist of domestic life, free from sensationalism, and, in the moral tone of her stories, quite unobjectionable.

HOLMES, NATHANIEL (1815–1901). An American jurist and author, born in Peterboro, N. H. He graduated at Harvard, began legal practice in 1839 at St. Louis, and was judge of the Missouri Supreme Court from 1865 to 1868. From that time until 1872 he was Royall professor of law at Harvard. In *The Authorship of Shakespeare* (1866; enlarged ed., 1886) he credits Francis Bacon with the dramas, and

he published also *Realistic Idealism in Philosophy Itself* (2 vols., 1888) and an *Historical Address* (1890).

HOLMES, OLIVER WENDELL (1809-94). An American man of letters, born at Cambridge, Mass., Aug. 29, 1809, son of the Rev. Abiel Holmes (q.v.), a minister of Calvinistic orthodoxy, who withstood the Unitarianism which was then gaining ground, and to which his son was later to give his adherence. Holmes was sent to Phillips Academy, Andover, Mass., for his preliminary education, and graduated from Harvard College in 1829. He at once entered the Law School of that institution, but, finding the law uncongenial, he gave it up for medicine. While a law student, he wrote and published in the *Boston Advertiser*, in 1830, his well-known and stirring verses, "Old Ironsides," which were an effective and popular protest against the proposed breaking up of the famous frigate *Constitution*. After three years in Harvard Medical School, Holmes in 1833 sailed for Europe, where he studied two years, chiefly in Paris, and on his return began the practice of medicine in Boston in 1836. The same year witnessed the publication of his first volume of poems. In 1838 he was appointed to the professorship of anatomy at Dartmouth College, a post which he held for two years. Thenceforth he passed his life almost wholly in Boston, with which city his name became very intimately associated. On June 15, 1840, he married Miss Amelia Lee Jackson, of Boston. His only important contribution to medical science was made in 1843, when he published his essay on the *Contagiousness of Puerperal Fever*, though he wrote numerous other scientific papers. From 1847 to 1882 he was Parkman professor of anatomy and physiology in Harvard Medical School. He was, however, not really eminent in his profession. His literary gift was marked, and he was less renowned in Boston as a practitioner than as a writer of very facile, witty verse, collections of which appeared from time to time until *Before the Curfew*, the last of them, was published in 1888.

Until 1857, however, his reputation was almost wholly local. The establishment in that year of the *Atlantic Monthly*, under the editorship of Lowell, brought him a national and almost world-wide vogue through the serial publication in that magazine of *The Autocrat of the Breakfast Table*, which appeared in book form in 1858. These delightfully egotistical talks, full of brilliant wit and buoyant seriousness, essentially of New England and Boston, had had their origin in two forgotten essays by Holmes in the *New England Magazine* in 1833. The success of *The Autocrat* was remarkable, and Holmes has been likened to almost every famous essayist from Montaigne to Lamb. Among orthodox Calvinists of the day the sketches met with disfavor, since the ideas and the manner were those of an essential rationalist. They were followed in the next year by a series scarcely less delightful, *The Professor at the Breakfast Table* (pub. 1860 in book form), and after a lapse of more than a decade, in 1871-72, by the third and last volume of the series, *The Poet at the Breakfast Table*. *The Autocrat*, however, is the best, most original, and most popular of the works of Holmes, who is often called the "Autocrat."

In 1861 Holmes published his first novel, *Elsie Venner*. Though rather formless and un-

even in quality and inartistic in method, it is interesting and full of power. More commonplace in idea than *Elsie Venner*, but equally interesting in its delineation, often rather contemptuous, of New England character, was *The Guardian Angel* (1867). In the interval between these two novels appeared *Songs in Many Keys* (1861) and *Humorous Poems* (1865) and a volume of prose, *Soundings from the Atlantic* (1863). His remaining literary work contained nothing very new or striking. The chief titles are: *Mechanism in Thought and Morals* (1871); *Songs of Many Seasons* (1874); *John Lothrop Motley* (1878), a memoir; *The School-Boy* (1878); *The Iron Gate, and Other Poems* (1880); *Pages from an Old Volume of Life* (1883); *Medical Essays* (1883); *Ralph Waldo Emerson* (1884), a life; *A Mortal Antipathy* (1885), his last novel, inferior to the two former; *The New Portfolio* (1885-86), in the *Atlantic*; *Our Hundred Days in Europe* (1887), an account of a voyage taken with his wife and daughter; *Before the Curfew, and Other Poems* (1888); and *Over the Tea-Cups* (1890), in the vein of *The Autocrat*. His death occurred in his eighty-sixth year, in Boston, Oct. 7, 1894.

Dr. Holmes was slight in stature and fastidious as to his personal appearance. In temper he was humane and kindly, particularly gracious to his numerous correspondents when confident of their sincerity, and genial in all his writing. His social accomplishments were unusual; he is said to have been the best talker in Boston. His style, at its best, is the style of spoken discourse—light, intimate, and winning, but not flippant. His verse, which is mainly of an occasional character, such as poems read at reunions of his college class or scattered throughout the pages of *The Autocrat*, is, like that prose work, sparkling with wit, or a graceful compound of gravity and humor. He is a prince among writers of *vers de société*. Among the best known of his poems are "Old Ironsides," "The Chambered Nautilus," "The Last Leaf," "Dorothy Q.," "The Voiceless," "The Deacon's Masterpiece; or, the Wonderful One-Hoss Shay."

Bibliography. Consult J. T. Morse, *Life and Letters of Holmes*, vols. xiv and xv of the *Collected Works*; T. W. Higginson, *Old Cambridge* (1899); Howells, *My Literary Friends and Acquaintance* (1899); S. M. Crothers, *O. W. Holmes* (1909). The standard edition of his works is the Riverside, in 15 volumes (Boston, 1892). A complete edition of his works in 14 volumes was published in New York (1913).

HOLMES, OLIVER WENDELL, JR. (1841-). An American jurist, son of Dr. O. W. Holmes. He was born in Boston, was educated at Harvard, served in the Civil War and was three times wounded—at Ball's Bluff, at Antietam, and at Fredericksburg. He practiced law in Boston, edited the *American Law Review* (1870-73), became professor of law at Harvard in 1882, and in the same year was appointed a member of the Massachusetts Supreme Court, of which he became Chief Justice in 1899. In 1902 he was named to succeed Justice Gray in the United States Supreme Court, where his profound legal learning, his sound judgment and humor, and his gifts of literary expression have given him a position of great influence. Holmes edited the twelfth edition of Kent's *Commentaries* and published his own Lowell Institute lectures, *The Common Law* (Boston,

1881), a notable contribution to our legal history. He has also published a volume of *Speeches* (Boston, 1913).

HOLMES, SHERLOCK. See DOYLE, SIR ARTHUR CONAN.

HOLMES, THEOPHILUS HUNTER (1804-80). An American soldier, prominent on the Confederate side in the Civil War. He was born in Sampson Co., N. C., graduated at West Point in 1829, served in the Florida War and the War with Mexico, and at the outbreak of the Civil War was acting as superintendent of the general recruiting service, with the rank of major. In April, 1861, he resigned his commission in the United States army and for a time was engaged in organizing the State troops of North Carolina. He became a brigadier general in the Confederate service soon after the secession of his State, commanded the Confederates in the engagement at Aquia Creek, was promoted to be major general, and from September, 1862, to March, 1863, was in command of the Trans-Mississippi Department, attaining the rank of lieutenant general. On July 3, 1863, he made an unsuccessful attack on Helena, Ark. In 1864 his health failed, and he was assigned to command the reserve forces in North Carolina. After the war he retired to his farm near Fayetteville, N. C.

HOLMES, T(HOMAS) RICE (EDWARD) (1855-). A British historian, born in County Westmeath, Ireland. He was educated at Christ Church, Oxford, and became a schoolmaster, teaching in St. Paul's School from 1886 to 1909 and then receiving a civil-list pension. He wrote an excellent *History of the Indian Mutiny* (1883; 5th ed., 1898) and *Four Famous Soldiers* (1889), but is even better known for his studies of Julius Caesar's campaigns in Gaul and Britain—*Cæsar's Conquest of Gaul* (1899; 2d ed., 1911), *Ancient Britain and the Invasions of Julius Cæsar* (1907), and an English version of Cæsar's *Commentaries on the Gallic War* (1908). Parts of the works on Cæsar's campaigns in Gaul and Britain were translated into German as *Cæsars Feldzüge in Gallien und Britannien*, by W. Schott and Felix Rosenberg (Leipzig, 1913). Holmes also edited, with Introduction and Notes, Cæsar's *Commentarii de Bello Gallico* (Oxford, 1914).

HOLMES, WILLIAM HENRY (1846-). An American anthropologist and archaeologist. He was born near Cadiz, Ohio, and after graduating at the McNeely Normal College (1870) was assistant on the United States Geological Survey (1872-80). During that period he accompanied Dr. F. V. Hayden's explorations in the Rocky Mountain region and superintended the survey of the San Juan territory until the reorganization of the survey (1880), when he was appointed geologist in charge of the department of illustrations. He had charge of the archaeological explorations of the Bureau of Ethnology in 1889-93, in 1894-98 was professor of archaeologic geology at the University of Chicago, from 1898 to 1902 and again after 1910 was curator of the United States National Museum, and was chief of the Bureau of American Ethnology from 1902 to 1909. He was president of the American Anthropological Association, and of the National Society of Fine Arts in 1909. In 1905 he became a member of the National Academy of Sciences. He edited geological publications, including Hayden's *Atlas of Colorado* and the eleventh and twelfth re-

ports of the Geological Survey, and published: *Archæological Studies among the Ancient Cities of Mexico* (1895); *Stone Implements of the Potomac-Chesapeake Tidewater Province* (1897); and papers on aboriginal American art.

HOLMGREN, hölm'grän, ALARIK FRITHIOF (1831-97). A Swedish physiologist, born in Vestra Ny Socken, Östergötland, and educated at the University of Upsala, at the University of Berlin under Du Bois-Reymond and Helmholtz, and under Brücke and Ludwig in Vienna. In 1864 he became professor of physiology at Upsala, the first chair in that subject in Sweden, and soon afterward founded a physiological laboratory. His medical studies were mostly in the field of ophthalmology, and he was an authority on color blindness; his works on this subject, "Om den medfödda färgblindhetens diagnostik och teori," in *Nordisk medicinsk Arkiv* (1874), and *Om färgblindheten i dess förhållande till järnvägstrafiken och sjöväsenet* (1877), have been translated into many languages. Holmgren was a firm believer in the hygienic value of Swedish gymnastics. He edited the *Skandinavisches Archiv für Physiologie* (1889 to his death, 7 vols.).—His wife, ANN MARGRETA TERSMEDEN (1850-), a strong advocate of education, wrote, under the pseudonym Märta Bolle, the novels *Fru Stråhle* (1894) and *När Riddar Alf suckar* (2 vols., 1896).—His brother, AUGUST EMIL ALGOT HOLMGREN (1829-88), was a naturalist of much ability. He wrote: *Ichneumonologia Suecica* (1864); *Handbok i Zoologi* (1865-71); *Om Småfåglarne* (1869); *Om skadeinsekter inomhus* (1879), besides other works on entomology and ornithology.

HOLMIA, höl'mi-ä. A characteristic genus of trilobites found in the Lower Cambrian rocks. It possesses a cephalon very much like *Olenellus*, but 16 free thoracic segments and a telson that is composed of a small plate without apparent segmental divisions, while the pleura of the thorax end in rounded spines. It occurs in Scandinavia and America.

HOLOCAINE, höl'o-kä'in. A drug used as a local anæsthetic, especially in operations upon the eye. It is slightly more irritating than cocaine, but has germicidal properties. It has a greater effect on inflamed tissues than cocaine and does not produce dilatation of the pupil. The drug has been employed successfully in suppurative conditions of the cornea.

HOL/OCEPH'ALI (Neo-Lat. nom. pl., from Gk. ὅλος, *holos*, entire + κεφαλή, *kephalē*, head). A subclass of cartilaginous fishes, including the single living family Chimaeridae. The number of living genera is small, but in the remote past they were a dominant group, numerous in species. See CHIMÆRA.

HOL/OGRAPH (Lat. *holographus*, from Gk. ὁλόγραφος, written entirely by the author's hand, from ὅλος, *holos*, entire + γράφειν, *graphein*, to write). A deed or writing wholly in the handwriting of the maker or author. In those countries which derive their legal systems mainly from the civil, or Roman, law, a holographic writing is deemed to prove itself; i.e., proof of the handwriting of the person whose instrument it purports to be is in itself sufficient to authenticate the document, without formal attestation by subscribing witnesses, notarial seals, and the like. This is true of Scotland, Quebec, and Louisiana, as well as of most continental states. In the common-law system, however, of England

and America no superior validity attaches to zoographic writings, and they require the same formal attestation and the same proof of validity as other writings. See EVIDENCE; HAND-WRITING, and the authorities there cited.

HOLOPTYCHIUS, hōl'ōp-tik'ī-ūs (Neo-Lat., from Gk. ὅλος, *holos*, entire + πτυχή, *ptychē*, πτύξ, *ptyx*, fold). A genus of fossil ganoid fish of the order Crossopterygii, remains of which are found commonly in the Catskill sandstones of North America and in the Old Red Sandstone of the British Devonian system. Some of the species were 30 inches long, with rounded tapering bodies and heterocercal tails. There are two dorsal fins, a pair of long, stout, pointed pectoral fins, and short pelvic and anal fins. The body was covered with large, rounded (cycloid) scales, the surfaces of which are marked by prominent ridges of ganoin, a structureless enamel. These scales, of gray or bluish-white color and 1 to 3 inches in diameter, are very abundant in some parts of the Catskill formation in New York and Pennsylvania. See CATSKILL FORMATION; DEVONIAN SYSTEM; GANOIDEI; FOSSIL.

HOLOSTEI, hōl-ōs'tē-i (Neo-Lat. nom. pl., from Gk. ὅλος, *holos*, entire + ὀστέον, *osteon*, bone). A group of bony ganoids, embracing the garpikes and bowfins. See GAR; BOWFIN.

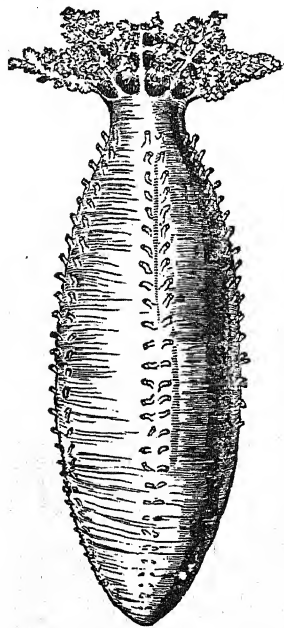
HOLOTHURIAN (from Lat. *holothurium*, Gk. ὁλοθούριον, water polyp; probably from ὅλος, *holos*, entire + θούριος, *thourios*, θύπος, *thouros*, impetuous). An echinoderm of the class Holothuroidea, easily recognized by the soft body,

generally wormlike form, and circle of tentacles about the mouth. The madreporic plate is internal. Sea cucumber, sea squirt, and sea slug are some of the popular names of these animals, whose dried bodies form the Oriental trepang (q.v.). The class have not the covering of calcareous plates characteristic of the more typical Echinodermata, but a tough, leathery, muscular integument, in some genera strengthened by minute or rather large calcareous plates or hooks, very irritable and capable of great distention and contraction. Some of them are almost globose, some truly wormlike; but the same individual is often capable of extending itself to

urchins, are the ambulacral feet, of which there are sometimes five double rows, while sometimes they are distributed over the whole surface of the body; but some of the species have the feet developed only on the ventral side, and the body then presents an upper and an under surface. When the feet are furnished with suckers and are very extensible, they are called pedicels; but when they end in a blunt point and their function seems to be chiefly respiratory, or to serve as organs of touch, they are called papillae. Sometimes all the feet are pedicels; sometimes there are pedicels on the ventral side and papillae on the dorsal; rarely all the feet are papillae. In two families the feet are completely wanting.

The radiate structure is apparent at the mouth, which is surrounded with tentacles, in number frequently a multiple of five, exhibiting considerable variety of form and capable of being more or less retracted. These tentacles vary in number from 8 to 30, but 10, 12, 15, and 20 are the usual numbers. They are very rarely short, simple, and unbranched; generally they are provided with branches, which may be arranged along the sides, clustered at the top, or irregularly scattered. The tentacles are very sensitive and are the most important sense organs of the animal; upon them are occasionally found special sense cups, supposed to be olfactory, or there may be at the base pigment eyes or positional organs. The nervous system is perfectly radiate in structure and very simple in organization. The mouth opens into an alimentary canal, usually much longer than the body and therefore more or less looped or coiled. An œsophagus, stomach, intestine, and cloaca can usually be distinguished. Arising from the cloaca, there are often two irregularly branched organs, known as the respiratory trees. These are hollow, very thin-walled, and capable of containing a great deal of water, which they receive through the anus. They are excretory and perhaps respiratory in function. In many species there arise from the wall of the cloaca, and extend into the body cavity of the animal, numerous glandular tubules, known as Cuvier's organs. These can be ejected from the anus as long, sticky threads, and thus seem to be protective. The blood system is well developed in most holothurians, especially along the intestine. In those forms which have a respiratory tree one branch of it is often closely bound up with a network of blood vessels, arising from the principal vessel on the intestine. The sexes are generally separate, hermaphrodite forms being quite unusual; but there is no external difference between male and female, save in a very few forms. The eggs are generally thrown out into the water, where they are fertilized; but several viviparous forms are known, in which the eggs fall into the body cavity of the mother, and the young develop there. In such cases the development is direct, but in species whose eggs develop in the water the young assume a peculiar larval form, known as the *auricularia*, from which the adults develop by a more or less complicated metamorphosis. Several cases are known of female holothurians which brood their eggs and care for the young.

The holothurians are capable of the most extraordinary regeneration of parts, even of the most important organs. In direct relation with this is their curious and noteworthy habit of evisceration. Many species when alarmed or irritated expel from the anal opening (or less



THE COMMON NORTH ATLANTIC HOLOTHURIAN.

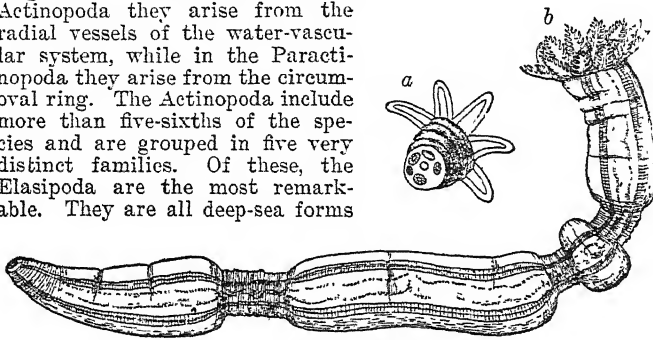
(*Pentacta frondosa*.)

everal times the length which it has in a state of repose. In locomotion the body is extended and contracted as in the annelids, and in the pedous forms this is the only means of locomotion, except such aid as is given by the tentacles. In the pedate forms the principal organs of locomotion, as in starfishes and sea

commonly the mouth) the viscera, either wholly or in part. They thus lose their entire digestive, reproductive, respiratory, and excretory systems and a large part of the blood system; but if not disturbed further, they will in the course of a few weeks replace all they lost with an entirely new set.

Holothurians are found in all seas, but particularly abundant in the West Indies and between Asia and Australia. The largest American species is *Holothuria floridana*, which abounds just below low-water mark on the Florida reefs. Another large one, *Cucumaria frondosa*, inhabiting the North Atlantic and probably circumpolar, is about a foot in length and is yellowish brown. Many of the tropical species exhibit attractive colors and are among the creatures which make the bottom of the sea, particularly among coral reefs and islands, extraordinarily interesting.

The holothurians (Holothurioidea) are classified in two orders according to the point of origin of the tentacles. In the Actinopoda they arise from the radial vessels of the water-vascular system, while in the Paractinopoda they arise from the circum-oval ring. The Actinopoda include more than five-sixths of the species and are grouped in five very distinct families. Of these, the Elaspoda are the most remarkable. They are all deep-sea forms



SYNAPTA.

a, free-swimming young; b, adult synapta.

and occur in all parts of the world. Many of them assume the most grotesque shapes, and some reach a large size. The Paractinopoda are all footless forms, of a single family. The best-known genus is *Synapta* containing more than 50 species, found in all parts of the world. Over 600 species of holothurians are known, varying in size from those $\frac{1}{2}$ inch long up to certain tropical species 2 or even 3 feet in length. The colors vary from white, or almost transparent, to jet black; but as a rule the colors are more or less in correspondence with the bottom on which the animal lives. They chiefly feed on Foraminifera. Their movements are generally very sluggish, and they seem to have few enemies. All are harmless; but the only ones of any use to man are the larger forms, from which bêche de mer, or trepang, a great delicacy with the Chinese, is prepared.

Consult: Lampert, *Die Seewalzen* (Wiesbaden, 1885); Ludwig, "Die Seewalzen," in Bronn, *Klassen und Ordnungen des Tierreichs: Echinodermen*, vol. i (Berlin, 1889-92), a standard work on holothurians; one of the best works in English is Théel, "Report on the Holothurioidea," in *Challenger Reports: Zoölogy*, vol. iv, part xiii, and vol. xiv, part xxxix (London, 1882 and 1886); Bather and others, "Echinodermata," in Lankester's *Treatise on Zoölogy* (ib., 1900).

HOLOTHUROIDEA. A class of echinoderms. See ECHINODERMATA; HOLOTHURIAN.

HOLROYD, hōl'roid, SIR CHARLES (1861-). An English painter and etcher, born at Leeds. He studied under Legros (q.v.) at the

Slade School, University College, London, and for two years in Italy. On his return he was Legros's assistant for four years. He was the first keeper of the National Gallery of British Art (Tate Gallery) and in 1906 became director of the National Gallery. He was knighted in 1903. His best-known etchings are the "Monte Olivetto" series, the "Icarus" series, and the "Eve" series. He frequently exhibited at the Royal Academy, the Royal Institute of Painters in Water Colors, and the Royal Society of Painter Etchers. His book on *Michel Angelo* (London, 1903) is a scholarly production.

HOLST, hōlst, HANS PETER (1811-93). A Danish poet and novelist, born of humble parents at Copenhagen. From 1875 until his death he was dramaturgist for the Royal Theatre, Copenhagen. His first work to attract attention was a memorial poem on the death of Frederick VI (1839). This was followed by *Ude og Hjemme*, prose and verse (1843), and *Den lille Hornblaser* (1849; 9th ed., 1902), a collection of patriotic poems. He also wrote a number of plays, vaudevilles, and novels, and translated *Much ado about Nothing* (1880). His *Udvalgte Skrifter*, in 6 vols., appeared in 1887-88. Consult T. Arentzen, *Danske Digtere i det 19 Aarhundrede* (Copenhagen, 1864).

HOLST, hōlst, HERMANN EDUARD VON (1841-1904). A German American historian and educator, born at Fellin in Livonia, of German parentage. He studied at Dorpat from 1860 to 1863 and at Heidelberg from 1863 to 1865 and became a tutor at St. Petersburg in 1866, but was excluded from the Russian dominions in the following year for publishing a pamphlet of which the Russian government disapproved, and emigrated to America. Settling in New York, he was an assistant editor of Schem's *Deutsch-amerikanisches Konversations-Lexikon*. He returned to Germany, was professor of history in the University of Strassburg from 1872 to 1874 and in the University of Freiburg from 1874 to 1892, visited America in 1878-79 and in 1884 served for a number of years in the Baden Diet, for the last two sessions as vice president, and in 1892 became head of the department of history in the newly founded University of Chicago. In 1900 ill health compelled his retirement, and he returned to his home in Freiburg. Von Holst's works are almost altogether on American topics. The chief defect in Von Holst's studies in American history is found in the fact that he regards the slavery question as dominant to the exclusion of all others. His *Verfassung und Demokratie der Vereinigten Staaten von Amerika* (5 vols., 1873-91; Eng. trans. by Lalor and Mason, *The Constitutional and Political History of the United States*, 8 vols., 1877-92) is his best-known work and contains a remarkably able presentation of the Federalist and antislavery view of American political history. More than half of it is devoted to the decade 1850-60. Among his other publications are: *Das Staatsrecht der Vereinigten Staaten von Amerika* (1885; Eng. trans., *The Constitutional Law of the United States of America*, 1887); *John C. Calhoun*, in the "American Statesmen Series" (1882); *John*

Brown (1888), *The French Revolution Tested by Mirabeau's Career* (1894). Consult *Hart*, "Hermann von Holst," in the *Political Science Quarterly*, vol v (New York, 1890), and the *Nation*, vol lxxviii (ib., 1904).

HOLSTEIN, hōl'stīn. Formerly a duchy belonging to Denmark, and at the same time a member of the Holy Roman Empire and of the Germanic Confederation (Map Germany, C 1). In 1864, after Schleswig and Holstein had been wrested from Denmark, Holstein was placed in the care of Austria (Germany taking Schleswig). It was ceded in 1866 to Prussia at the end of the Austrian War and now forms the southern part of the Province of Schleswig-Holstein (q v).

HOLSTEIN, or **HOLSTEIN-FRIESIAN**. A breed of dairy cattle. See **CATTLE**.

HOLSTEIN, FRIEDRICH VON (1837-1909). A German diplomat and statesman, born in Schwedt. Entering the diplomatic service, he held minor appointments at St Petersburg, Rio de Janeiro, London, Washington, Florence, and Paris until 1876, when he was recalled to Germany to take charge of the political department of the Foreign Office. When Bismarck was dismissed in 1890, Holstein was retained by Count Caprivi in the Foreign Office, where his influence practically shaped the German foreign policy. He was largely responsible for the German seizure of Kiaochau (q v), China. The Emperor William II's visit to Tangier was the result of his advice, but the later proceedings in the Morocco crisis did not meet with his approval, and the disregard of his protests led to his retirement in 1906. Von Holstein was little heard of by the general public, but his influence in international affairs was very great.

HOLSTEIN-GOTTORP, güt'tōrp. See **OLDENBURG**, HOUSE OF.

HOLSTON (hōl'stūn) **RIVER**. One of the two rivers, the French Broad (q v) being the other, which unite 4½ miles east of Knoxville, Tenn., to form the Tennessee River. It is formed by the junction of its North and South forks, about 1 mile below Kingsport, Sullivan Co., Tenn. From this point it flows in a generally southwesterly direction, its course to its confluence with the French Broad measuring 141½ miles. During rain tides it is navigable for about 50 miles for light-draft vessels. The fall of the river from its forks to its mouth is about 361 feet.

HOLT, HAMILTON (1872-). An American editor. He was born in Brooklyn, N Y, graduated from Yale University in 1894, and studied at Columbia University in 1894-97. He was managing editor of the *Independent* from 1897 to 1913, for some months was editor and owner, and in 1914 became editor alone. In 1912 he lectured at the School of Journalism, Columbia University. Widely known as a lecturer on international peace, as an advocate of simplified spelling, as a reformer of municipal government, and as a worker for improved social and labor conditions, he was chosen a trustee of the American College for Girls at Constantinople, and a member of the executive committee of the International Conciliation Society. While visiting Japan in 1912, he was decorated by the Mikado with the order (third class) of the Sacred Treasure. He is author of *Undistinguished Americans* (1906) and *Commercialism and Journalism* (1909).

HOLT, HENRY (1840-). An American author and publisher, born in Baltimore, Md.

He graduated from Yale University in 1862 and from Columbia Law School in 1864 and received the honorary degree of LL D from the University of Vermont in 1901. Associated with G P Putnam in the publishing business beginning in 1863, in 1873 he became president of Henry Holt and Company, publishers in New York City. At various times he lectured at Yale, Columbia, and the University of Vermont. He served as a member of the first executive committee of the Simplified Spelling Board, and as first chairman of the New York University Settlement Society. In 1913 he founded and undertook the editorship of the *Unpopular Review*, a quarterly magazine of high literary quality, containing contributions of a serious nature and in lighter vein by temporarily anonymous writers. He is author of *Calmie—Man and Nature* (1892, 6th ed, 1906), *Talks on Civics* (1901), *Sturmsee—Man and Man* (1905, 3d ed, 1906), *On the Civic Relations* (1907), *On the Cosmic Relations* (1914).

HOLT, SIR JOHN (1642-1710). An English jurist, born at Thame, Oxfordshire, Dec 30, 1642. After receiving his education at Oriel College, Oxford, he was called to the bar (1663) from Gray's Inn. He soon displayed a decided talent for law and became an able advocate, well versed in the constitutional law of England. In 1685-86 he was Recorder of London and about this time was appointed sergeant at law and king's sergeant. He fell into disfavor with King James II because of a decision favoring liberal government, but the ability which he displayed in the Convention Parliament raised him so high in the estimation of the Prince of Orange that, upon the accession of the latter to the English throne, Holt was made Lord Chief Justice of the King's Bench. As a judge, he was noted for the fairness and even kindness with which he treated accused persons and for his opposition to prosecutions for witchcraft. He was also opposed to standing armies and to the use of military power for the preservation of domestic peace. In 1694 he stoutly maintained his prerogative when assailed by the House of Lords, and seven years later he was equally firm in a clash with the House of Commons. He died in London, March 5, 1710. Consult *Report of all the Cases Determined by Sir John Holt, Kt., from 1688 to 1710, etc* (in the Savoy, 1738), *Report of Cases Argued, etc, in B[anc]o R[eg]næ in the Time of Queen Anne* (1b, 1737), Foss, *Judges of England with Sketches of their Lives, etc* (London, 1848-64), Burnet, *History of my own Time* (6 vols, London, 1838).

HOLT, JOSEPH (1807-94). An American jurist, born in Breckinridge Co, Ky, and educated at St Joseph's College and Centre College in the same State. He studied law, practiced in Elizabethtown, then in Louisville, lived for a time after 1835 in Mississippi, where he contested several suits with Sergeant S Prentiss, among them the case as to the ownership of some public land, claimed by the heirs of Newit Vick, for whom Prentiss was counsel. He attracted attention as politician and orator by his defense of R M Johnson in the Democratic National Convention in this same year (1835). He was a strong supporter of Buchanan in 1856 and was appointed by him Commissioner of Patents in the following year. In 1859 he became Postmaster-General and in 1860 succeeded

Floyd as Secretary of War. A Douglas Democrat before the war, he heartily supported the Union and in 1862 became Judge Advocate and two years later Judge-Advocate-General. As head of the department of military justice, he conducted the trial of Fitz John Porter and that of Lincoln's assassins. He was brevetted major general in 1865 and retired 10 years later.

HOLT, L(UTHER) EMMETT (1855–) An American physician. He was born at Webster, N. Y., and graduated from the University of Rochester in 1875 and from the College of Physicians and Surgeons (Columbia) in 1880. He was professor of the diseases of children at the New York Polyclinic from 1890 to 1901 and thereafter at the College of Physicians and Surgeons. He became also attending physician to the Babies Hospital and the New York Foundling Hospital, and a member of the board of directors, and secretary, of the Rockefeller Institute for Medical Research. Besides special articles on the diseases of children, he is author of *The Care and Feeding of Children* (1894, 7th ed., rev., 1914) and *Diseases of Infancy and Childhood* (1896; 6th ed., rev., 1911).

HOLTEI, hōl'ti, KARL VON (1798–1880). A German poet, dramatist, and novelist, born in Breslau. He took part in the campaign of 1815, studied law, and then, at the age of 21, went on the stage. In 1821 he married an actress, Luise Rogee, and after acting as secretary and dramaturgist to the Breslau Theatre for two years went to Berlin with his wife (engaged at the Court Theatre there) and wrote the very successful plays, *Die Wiener in Berlin* and *Die Berliner in Wien*. Soon after his first wife died (1825), he married Julie Holzbecher (1809–39), a clever comedienne. In 1833 he returned to the stage and toured with his wife, writing for this purpose *Loi-bee-baum und Bettelstab* and *Shakespeare in der Heimat* (1840). He died at Breslau in the cloister of the Brothers of Charity. The best of his productions is his *Schlesische Gedichte* (22d ed., 1905), lyrics in the Silesian dialect. Holtei's collected plays are contained in the *Theater* (1867). Besides his plays, operettas, and lyrics, Holtei wrote many novels, among which mention should be made of *Die Vagabunden* (4 vols., 8th ed., 1894), *Christian Lammfell* (5 vols., 4th ed., 1878), *Noblesse oblige* (2d ed., 1862), and others collected in *Erzählende Schriften* (1861–66), and sketches and criticisms. Consult the excellent autobiographical work *Vierzig Jahre* (8 vols., Berlin, 1843–50), Kurnik, *Karl von Holtei, ein Lebensbild* (Breslau, 1880), Otto Storch, *Karl von Holtei* (Waldenburg, 1898), P. Lindau, *Holteis Romane* (Berlin, 1904).

HOLTHAUSEN, hōl'thou'zen, FERDINAND (KARL WENNEMAR) (1860–) A German philologist, born in Soest, Westphalia. He was educated at Leipzig, Heidelberg, Jena, and Berlin, became lecturer at Heidelberg in 1885 and at Göttingen in 1887, was made professor at Gießen in 1892, taught Germanics in Gothenburg, Sweden, in 1893–1900, and then became professor of English philology at Kiel, where he edited the *Kieler Studien zur englischen Philologie*. He edited many Old English and Middle English texts, *Havelok* (1901, 2d ed., 1910), *Beowulf* (1905, 3d ed., 1912), *Cynewulf's Elene* (1905, 2d ed., 1910), etc., and published *Studien zur Thidrekssaga* (1884), *Soester Mundart* (1886), *Altislandisches Elementarbuch* (1895),

Altislandisches Lesebuch (1896), *Altislandisches Elementarbuch* (1899), and a revised edition of Grein's *Sprachschatz* (1912 et seq.).

HOLTÓN, hōl'tūn. A city and the county seat of Jackson Co., Kans., 30 miles north of Topeka, on the Union Pacific, the Chicago, Rock Island, and Pacific, and the Missouri Pacific railroads (Map Kansas G 4). It is the commercial centre for a stock-raising and farming region and has a rat-trap factory, bottling works, quilting factory, and fruit nursery. Campbell College was established here in 1882. Settled in 1859, Holton was incorporated in 1870 and adopted the commission form of government in 1912. The city owns its water works and electric-light plant. Pop., 1900, 3082, 1910, 2842.

HOLTON, LUTHER HAMILTON (1817–80). A Canadian statesman. He was born in South Leeds, Ontario, and when nine years old was taken by his parents to Montreal. There he became a clerk (1830), and later a partner, in the city's leading forwarding house. After 1846, when the repeal of the Corn Laws (qv) deprived the British American colonies of preferential treatment, Holton was one of the prominent signers of the manifesto of 1849, which favored annexation to the United States. He was an advanced free trader and one of the founders of *Le Parti Rouge* (see *POLITICAL PARTIES, Canada*). In 1854–57 he represented the city of Montreal in the Canada Legislative Assembly, and in 1862–63 he was a member of the Canada Legislative Council (at that time elective) for the Victoria Division. For part of 1863 he was Commissioner of Public Works in the short-lived Brown-Dorion administration and in 1863–64 Minister of Finance in the Macdonald-Dorion cabinet. He opposed Canadian confederation and the coalition cabinet organized to facilitate it (see *BROWN, GEORGE*). Elected in 1867 to the first Dominion Parliament, he remained a member of that body until his death.

HOLTY, hōl'tē, LUDWIG HEINRICH CHRISTOPH (1748–76). A popular German poet, born at Mariensee, the son of a country parson. He studied theology at Göttingen (1769), fell in there with Burger, Voss, and the Stolbergs, and assisted in founding the patriotic poetic league of the *Hainbund*. He was naturally sentimental and dwelt, though not morbidly, on death, nature, and solitude, showing the influence of Rousseau and especially of the *Night Thoughts* of Young. Occasionally there is also a joyous or even a playful strain, but it is with harmonious melancholy that he is associated in the popular mind. In some of his odes he surpassed his teacher, Klopstock (qv). A few of his poems are known wherever German is sung. Holty's *Works* were collected in 1789, his complete works appeared in 1882. There is a life by Ruete (Guben, 1883), and biographies in the critical editions by Voss (Hamburg, 1835), Voigt (Hanover, 1858), and Halm (Leipzig, 1870).

HOLTZ, hōlts, WILHELM (1836–) A German physicist. He was born at Saatel, near Barth, in Pomerania, and studied physics and other sciences at Berlin, Dijon, and Edinburgh. He invented the electrical machine which bears his name (see *ELECTRICAL MACHINE*) in 1865 and engaged in many researches, particularly in electricity, but his health forced him to give up scientific investigations for a number of years. In 1877 he became assistant in the

physical laboratory of Greifswald, where in 1881 he was made privatdocent and three years later professor. He is the author of many papers on electricity published in the scientific journals and of two volumes on lightning protection, *Ueber Theorie, Anlage und Prüfung der Blitzableiter* (1878) and *Ueber die Zunahme der Blitzgefahr und ihre vermuthlichen Ursachen* (1880).

HOLTZENDORFF, hólts'en-dóif, FRANZ VON (1829-89). A German jurist. He was born in Vietmannsdorf, Prussia, studied law at Berlin, Heidelberg, and Bonn, became professor of jurisprudence at Berlin in 1860 and held the same professorship at Munich from 1873 until his death. He strove especially to correct the criminal law, to abolish the death penalty, and to improve the condition of penal institutions. He was interested and active in the Protestant Union, in the Berlin People's Kitchen, and in the reform of female labor, and he was considered an authority on international law. Among his works are *Französische Rechtszustände* (1859), *Die Reform der Staatsanwaltschaft in Deutschland* (1864), *Die Prinzipien der Politik* (2d ed, 1879), *Wesen und Wert der öffentlichen Meinung* (2d ed, 1880), *Das Verbrechen des Mordes und die Todesstrafe* (1874). He edited *Allgemeine deutsche Strafrechtszeitung* (1861-74), the *Encyclopädie der Rechtswissenschaft* (1880-90), a series of manuals on German law (1871-89), and, with Virchow, the *Sammlung gemeinverständlicher wissenschaftlicher Vorträge* (1866 et seq.). Consult Stoerk, *Franz von Holtzendorff* (Hamburg, 1889).

HOLTZENDORFF, HENNING VON (1853-) A German naval officer, born in Berlin. He entered the marine in 1869 and served through the different grades. In 1895-96 he commanded the cruiser *Prinzess Wilhelm* in the Far East, where he was again stationed in 1899-1901 in command of the *Kurfürst Friedrich Wilhelm*. Returning to Germany, he became chief inspector of docks at Danzig in 1901, was promoted second admiral in 1902, rear admiral in 1904, vice admiral in 1907, and admiral in 1910, and was chief of the first squadron of the sea fleet in 1906 and of the entire fleet in 1910. He retired from active service early in 1913 and in June of that year became a member of the House of Lords.

HOLTZ MACHINE. See ELECTRICAL MACHINE.

HOLTZMANN, hólts'mán, ADOLF (1810-70). A German philologist, born at Karlsruhe. He studied theology at Berlin and Halle and was for a short time vicar at Kandern. In 1832 he renewed his studies at Munich under Franck and later at Paris under Burnouf and made a specialty of old Germanic dialects and Sanskrit. His works are of unequal value. In 1852 he was made professor of German and Sanskrit at Heidelberg, where he died. His works are in Indian philology, *Ueber den griechischen Ursprung des indischen Tierkreises* (1841) and the translations *Ramayana* (last ed, 1843), *Indische Sagen* (1845-47), in Germanics, *Kelten und Germanen* (1855), an attempt to identify the two peoples, *Untersuchungen über das Nibelungenlied* (1854) and *Das Nibelungenlied* (1857), both attacking Lachmann's theory of the composite authorship of the poem and renewing the question, Holtzmann's view being that such epics as the *Nibelungenlied* and the *Thas* were not synthetic products but remnants

of greater and more complete works, the much more important grammatical works, the edition of Isidorus (1836), *Ueber den Umlaut* (1843), *Ueber den Ablaut* (1844), *Altdeutsche Grammatik* (uncompleted, 1870-75), and the posthumous works, *Germanische Altertümer mit Text, Uebersetzung und Erklärung von Tacitus Germania* (1873) and *Deutsche Mythologie* (1874). Consult necrologies in *Germania*, vol. xvi (Vienna, 1871), and *Zeitschrift für deutsche Philologie*, vol. iii (Halle, 1871).

HOLTZMANN, HEINRICH JULIUS (1832-1910). A German Protestant theologian, born at Karlsruhe. Educated at Berlin, he was appointed professor of theology at Heidelberg in 1865 and at Strassburg in 1874. He became especially known for his exegetical and critical works on the New Testament. These include *Die synoptischen Evangelien, ihr Ursprung und geschichtlicher Charakter* (1863), *Kritik der Epheser- und Kolosserbriefe* (1872), *Die Pastoralbriefe* (1880), *Lexikon für Theologie und Kirchenwesen* (1882, 3d ed, 1895), with Zopf, *Lehrbuch der historisch-kritischen Einleitung in das neue Testament* (1885, 3d ed, 1892), *Handkommentar zum neuen Testament* (1889-90, later editions), with Lipsius, Schmiedel, and Von Soden, *Lehrbuch der neutestamentlichen Theologie* (2 vols, 1897), *Die Entstehung des neuen Testaments* (1904), *Das messianische Bewusstsein Jesu* (1907).

HOLTZMANN, OSKAR (1850-) A German New Testament critic, born in Stuttgart, where his father was director of the Royal Polytechnic. He was educated at the universities of Strassburg, Göttingen, and Giessen and in the theological seminary at Friedberg, preached for a year and taught in secondary schools and in 1890 became professor of New Testament exegesis at the University of Giessen. He taught in the Giessen Gymnasium also. Probably his most important work is the valuable *Neutestamentliche Zeitgeschichte* (2d ed, 1906). He published, besides, *Das Johannes-evangelium untersucht und erklärt* (1887), *Das Ende des jüdischen Staatslebens und die Entstehung des Christentums* (1888), *Christbild der Geschichte und Christbild der Dogmatik* (1890), *Jesus Christus und das Gemeinschaftsleben des Menschen* (1893), *Leben Jesu* (1901, English trans, 1904), *Jüdische Schriftgelehrsamkeit zur Zeit Jesu* (1901), *Das Messiasbewusstsein Jesu* (1902), *War Jesus Blutsatzer?* (1903), *Das christliche Gottesglaube* (1905), *Christus* (1907), and, with Beer, the text, with translation and commentary, of the Mishna (1912 et seq.).

HOLUB, hó'ľup, EMIL (1847-1902). An African explorer, born at Holitz in Bohemia. He studied medicine and natural science at the University of Prague and then, in 1872, went to South Africa. He lived for a time in the diamond fields as a surgeon, but early in 1873 made a journey through the southern Bantu countries and in the fall a second to the Transvaal and the lands to the north. In 1875 he succeeded in reaching the Zambezi and the Victoria Falls and brought back with him a rich natural science and ethnological collection, which he divided among various European institutions. In 1883, accompanied by his wife, he started from Cape Town with the intention of traversing the entire length of the African continent to Egypt. He had accomplished scarcely one-third of the journey, however, when

he was attacked by hostile tribesmen on the Kafue, a northern tributary of the Zambezi, and only after a desperate struggle was he able to win his way back to civilization. Fortunately he was able to save the large collection which he had gathered, and this, after it had been exhibited in Vienna and Prague, he divided among a number of museums. He died from the effects of malaria acquired during his explorations. His publications include *The Victoria Falls* (1879), *Sieben Jahre in Sudafrika* (1880-81, trans by Ellen E. Frewer as *Seven Years in South Africa*, 2d ed., 1881), *Von der Kapstadt ins Land der Maschukulumbé* (2 vols., 1888-90).

HOLY ALLIANCE A league formed after the fall of Napoleon, at the instance of Alexander I of Russia, by the sovereigns of Russia, Austria, and Prussia, nominally to regulate the relations of the states of Christendom by the principles of Christian charity. As it formed itself in the mind of Alexander it was the scheme of a pietistic idealist, but it was utilized by Metternich as an instrument of his reactionary policy. The document was drawn up by Alexander and was signed by the three rulers at Paris in September, 1815. In addition to the original signatories, Naples, Sardinia, France, and Spain acceded to the treaty, and it received the commendation, though not the signature, of the Prince Regent of Great Britain. It was formally made public in the *Frankfort Journal*, Feb. 2, 1816. Metternich, who privately sneered at the treaty, used it as the basis for the conferences of Troppau and Laybach and the congresses of Karlsbad and Verona, which were intended to unite the Powers in support of absolutism everywhere. It was in the name of the Holy Alliance that Austria, in 1821, crushed the revolutions in Naples and Piedmont and that France, in 1823, restored absolutism in Spain. Apart from this use of it, as one writer has said, "no one of the princes who adhered to the Holy Alliance, with the single exception of Alexander himself, ever took it seriously." Meaningless in itself, it soon ceased to have any importance, especially when both France and England refused to give it any support.

The text of the covenant is as follows:

"In the name of the Most Holy and Indivisible Trinity. Holy Alliance of Sovereigns of Austria, Prussia, and Russia. Their Majesties the Emperor of Austria, the King of Prussia, and the Emperor of Russia, having . . . acquired the intimate conviction of the necessity of settling the steps to be observed by the Powers, in their reciprocal relations, upon the sublime truths which the Holy Religion of Our Saviour teaches. They solemnly declare that the present Act has no other object than to publish, in the face of the whole world, their fixed resolution, both in the administration of their respective States, and in their political relations with every other government, to take for their sole guide the precepts of that Holy Religion, namely, the precepts of Justice, Christian Charity, and Peace. *Art. I.* The three contracting Monarchs will remain united by the bonds of a true and indissoluble fraternity, and, considering each other as fellow countrymen, they will, on all occasions and in all places, lend each other aid and assistance, and, regarding themselves toward their subjects and armies as fathers of families, they will lead them, in the

same spirit of fraternity with which they are animated, to protect Religion, Peace, and Justice. *Art. II.* In consequence, the sole principle of action, whether between the said Governments or between their Subjects, shall be that of doing each other reciprocal service, and . . . to consider themselves all as members of one and the same Christian nation, the three allied Princes looking on themselves as merely delegated by Providence to govern three branches of the One family, namely, Austria, Prussia, and Russia, thus confessing that the Christian world, of which they and their people form a part, has in reality no other Sovereign than Him to whom alone power really belongs. *Art. III.* All the Powers who shall choose solemnly to avow the sacred principles which have dictated the present Act . . . will be received with equal aid and affection into this Holy Alliance. Done in triplicate and signed at Paris, the year of grace 1815, 14/26th September."

Perhaps the most noteworthy development from the Holy Alliance came from the attempt to extend its operation to the New World by the coercion of Spain's revolted colonies. George Canning (qv), on behalf of England, opposed this at the Congress of Verona, and the threatened invasion of American autonomy, together with the proposed colonization of the Pacific coast of North America by Russia, the leader in the Alliance, brought from the government of the United States the famous declaration of American policy known as the Monroe Doctrine (qv). For accounts of the Holy Alliance and its bearing upon contemporaneous history, consult the histories of the time and the biographies of leading persons connected with it. For its bearing on American history, the John Quincy Adams *Memoirs* are a veritable storehouse of material.

HOLY BROTHERHOOD See HERMANDAD

HOLY CITY The common designation among different peoples and religious sects for the city regarded as the chief place of their religion. The term is most often understood as applying to Rome, but has been used also of Jerusalem, Allahabad, Benares, Mecca, Medina, Moscow, Kiev, and Cuzco.

HOLY COAT. A relic preserved with the greatest reverence in the cathedral of Treves (qv). It is alleged to be the seamless robe, or upper garment, of Jesus Christ (John xix 23) and to have been discovered in the fourth century by the Empress Helena, in her memorable visit to Palestine (see HELENA, SAINT) and by her deposited at Treves. The earliest definite documentary evidence, supported, however, by still earlier incidental testimony, dates from the eleventh century. The holy coat of Treves was solemnly exhibited to the public gaze in 1196 and again in 1512, when Luther wrote against it and Leo X appointed it to be exhibited every seven years. The Reformation and wars prevented the regular observance of this religious festival, but it was celebrated in 1810 and was attended by a concourse of no fewer than 227,000 persons and in 1844 and 1891 by still greater crowds, while miraculous cures were confidently asserted to be performed by the precious relic. The exhibition of the holy coat in 1844 led to the secession of the "German Catholics" from the Catholic church. The seamless coat of Jesus is also said to be preserved in the church at Argenteuil, near Versailles, but this claim is not considered well founded. The legend here is that

it was given by Charlemagne to the monastery located there, his daughter Theodrada being abbess. Consult Joseph Hommer, *Geschichte des heiligen Rockes unseres Heilandes* (Bonn, 1844), Gildemeister and Sybel, *Der heilige Rock zu Trier und die zuanzig andern heiligen ungenaheten Rocke* (3d ed., Dusseldorf, 1845), Beissel, *Geschichte des heiligen Rockes* (Trier, 1889), R. F. Clarke, *Pilgrimage to the Holy Coat of Treves* (London, 1892), E. A. Plater, *The Holy Coat of Treves* (ib., 1891).

HOLY COMMUNION. See LORD'S SUPPER.

HOLY CROSS, COLLEGE OF THE A Roman Catholic institution of higher education, founded at Worcester, Mass., in 1843, by Rt. Rev. Benedict Joseph Fenwick, second Bishop of Boston. Holy Cross is the oldest Catholic college in New England. In its establishment Bishop Fenwick was aided by Rev. James Fitton, who had as early as 1838 established the Seminary of Mount St. James. This institution, with its 60 acres of land, Father Fitton presented to the Bishop in 1842, upon which site the college was built. The first college building was completed in 1844. On July 14, 1852, a fire destroyed the whole of the central building of the college, but in the following year the college, enlarged and remodeled, was again ready to receive students. Although, as noted above, instruction was carried on in the college beginning in 1843, it was not incorporated until 1865. A petition for a charter was presented to the Legislature of the State in 1849, but this was refused. From 1849 to 1852 and from 1858 to 1865 Georgetown College conferred the degrees on all the students who graduated from Holy Cross. The college buildings are situated on one of the highest of the eminences surrounding the city of Worcester. The old buildings have been enlarged and improved in many ways, and extensive new constructions and improvements have been made in recent years. Among the newer and larger buildings are the O'Kane Building, an extension of the first main building, which contains the gymnasium, reception halls, laboratories, and classrooms, Alumni Hall, opened in 1905, and Beaven Hall, opened in 1913. The system of education at the university is the one in use in all colleges of the Society of Jesus. The natural sciences and modern languages are by no means excluded, but the ancient languages and their literature are still retained as prescribed courses and, with mathematics and philosophy, form the chief studies. The college provides a number of scholarships for deserving students. The total enrollment in 1913-14 was 551, of whom 532 were in the college proper and 19 in the preparatory department. The degrees conferred are M. A., B. A., and Ph. B. The faculty numbered, in 1914, 46. The library contains about 40,000 volumes. The productive funds amount to about \$60,000, and the total annual income to about \$240,000. The president in 1914 was Rev. Joseph N. Dinand, S. J.

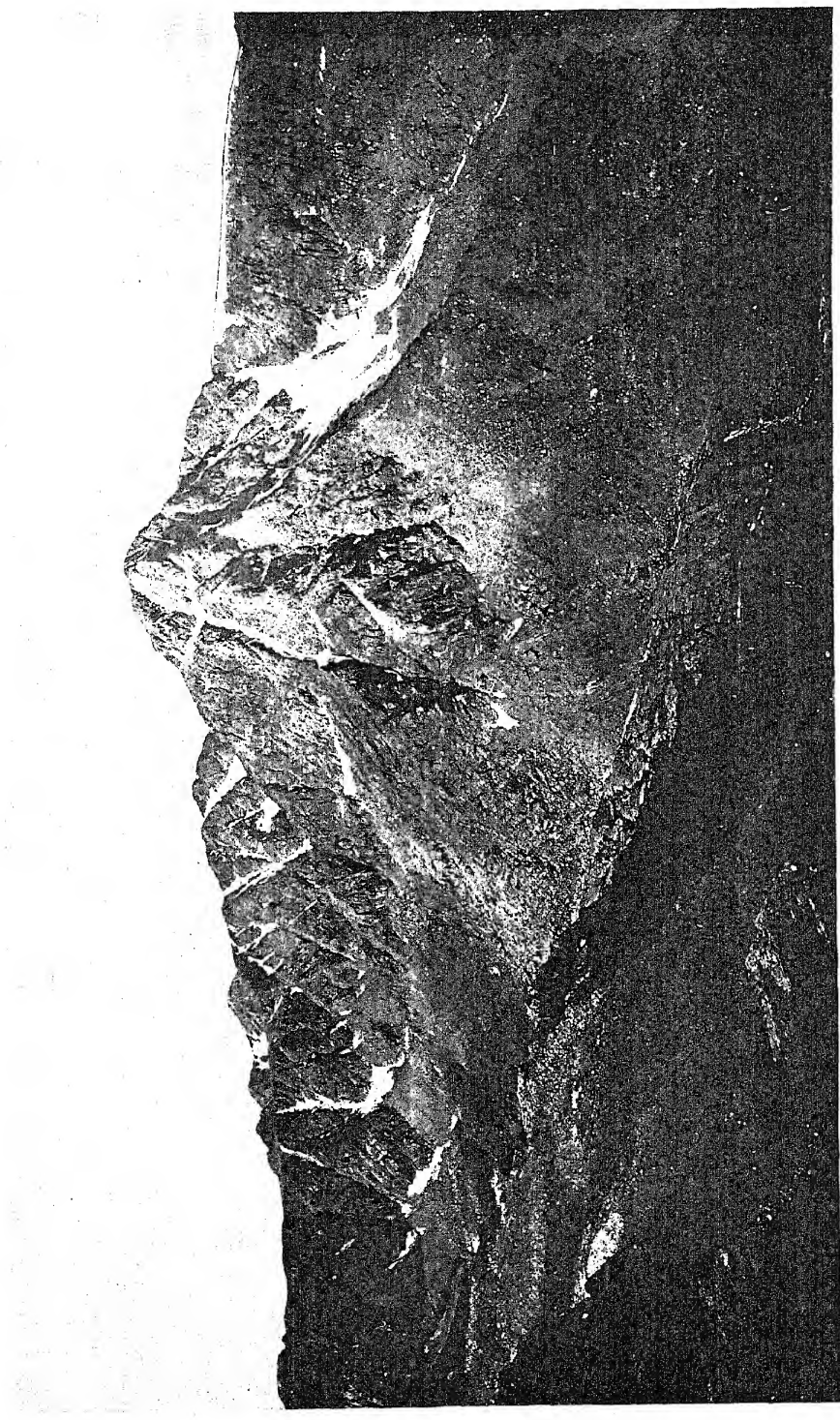
HOLY CROSS, CONGREGATION OF THE An institute formed in France in 1836 by uniting the Brothers of St. Joseph, founded at Ruillé in 1820, and the Auxiliary Priests of Le Mans, founded in 1835. The members teach and do missionary work. It had much success in France, where its schools and houses were suppressed by the Law of Associations (1901) and the members left for India, Canada, and the United States. It was introduced into the United States in September, 1841, by Father

Edward Sorin, who located in the wilderness near South Bend, Ind. This foundation has since developed into the important University of Notre Dame. There are colleges also in Washington, D. C., Oregon, Wisconsin, Ohio, Louisiana, and Texas, and many parish foundations and secondary schools. At Notre Dame the *Ave Maria*, a well-known Catholic weekly, is published. The university also awards every year on Mid Lent Sunday the Letare medal, an adoption of the old papal idea of the Golden Rose, to some distinguished American lay Catholic. It is, since the exile of the Congregation from France, the residence of the Father General. The congregation has 3 provinces, 60 houses, and 650 members. Four Sisters followed Father Sorin to South Bend in 1843. There St. Mary's College for Women at Notre Dame is now one of the most flourishing institutions in the West. There are more than 1000 Sisters working in the archdioceses of Baltimore, Chicago, New York, and San Francisco, where they conduct 1 college, 2 normal schools, 16 boarding schools, 40 academies and parish schools, 6 hospitals, and 4 asylums. Their greatest development was under Mother Angela (Eliza Gillespie, James G. Blaine's aunt), 1853-57. During the Civil War Mother Gillespie and 70 sisters took charge of six military hospitals in the Southwest. Consult F. J. Poirier, *Le Père Lefebvre et l'Académie* (Montreal, 1898), and Moreau, *Basile Antoine Moreau et ses œuvres* (Paris, 1900).

HOLY CROSS, ORDER OF THE The name of several monastic or semimonastic orders. The origin of the first community bearing this name is lost in obscurity, but leaving aside legendary accounts, we find the order definitely established in Italy as early as the accession of Pope Alexander III (1150). The mother house was at Bologna, and the work of the members was largely the care of the sick. They were confirmed by Urban III in 1187 and spread until they had 200 convents in all parts of Italy, the order declined later, so that Pius V was obliged to reform it in 1568, and Alexander VII to suppress it in 1656.

More important is the congregation of canons regular who were known in England as Crutched, or Crossed, Friars. This order was founded by Theodore de Celles at Huy, near Liège, Sept. 14, 1211, and confirmed by Innocent III five years later; it followed the rule of St. Augustine, assimilated in many particulars to that of the Dominicans. It spread rapidly throughout the Netherlands, France, Germany, having 90 convents, and several in England—in London (1298), Oxford (1349), Colchester, Hoxton, and other places. The order was reformed from within in 1410. At the present day, while still faithful to its original spirit, it has very few houses, the principal ones being two in Holland (St. Agatha, the mother house, and Uden in North Brabant) and three in Belgium. In 1857 an attempt was made to start a branch at Bay Settlement, Wisconsin, but it failed because of local obstacles not surmountable. Consult Hermans, *Annales Canoniarum Regularium Sancti Augustini, Ordinis Sanctæ Crucis* (3 vols., Bois-le-Duc, 1858).

The knightly order bearing this name is of some importance in the history of Bohemia. It is distinguished by a red six-pointed star in addition to the cross worn on the habit and was originally an outgrowth of the Hospitaller



MOUNTAIN OF THE HOLY CROSS

brotherhood attached, in the first half of the twelfth century, to the hospital of the Poor Clares in Prague. In 1238 Gregory IX constituted it a definite order, under the rule of St Augustine. It spread throughout Bohemia and other lands now included in Austria-Hungary and was one of the strongest bulwarks of the Church against the sectarian movements of the fifteenth and sixteenth centuries. At the siege of Eger in the Thirty Years' War it verified its knightly title by fighting at the head of the people. Its hospital at Prague was always open to new allies, and sheltered the first Jesuits in Bohemia in 1555, the Capuchins in 1599, and the Tinitarians in 1704. From 1561 to 1694 the order practically supported the archbishops of Prague, who had been deprived of their possessions in the wars of religion, making them grand masters during their incumbency of the see. The order now has less than 100 members, its library consists of 50,000 volumes, including many incunabula, and manuscripts of great value for Bohemian history. Consult Jacksche, *Der ritterliche Orden der Kreuzherren mit dem rothem Stern* (Vienna, 1882).

A Protestant Episcopal order of the same name was founded in 1881. Both priests and laymen are eligible, and its chief work is the carrying on of missions, conferences, and retreats. It conducts St Andrews School for mountain boys at Sewanee, Tenn., and the Kent School for boys at Kent, Conn.

HOLY CROSS MISSION. A Catholic mission on the north bank of the Yukon River, Alaska, opposite the native village of Koserefsky. The centre of industrial and religious instruction for 400 natives, the mission has greatly benefited the community, especially as to agriculture and stock raising. The adjacent village of Koserefsky, with a population of 287 in 1910, has a government school, with an average attendance of 100, the largest native school in Alaska.

HOLY CROSS MOUNTAIN. A celebrated peak of the Rocky Mountains in Colorado, situated in Eagle County, in the central part of the State, 15 miles northwest of Leadville (Map. Colorado, C 2). Its height is 14,170 feet. It derives its name from two snow-filled ravines, which cross each other at right angles and present from a distance the appearance of a white cross.

HOLY DYING, RULE AND EXERCISES OF. A devotional manual, by Jeremy Taylor, published in 1651. It was soon extensively used, reached a twenty-first edition in 1710, has been frequently republished, and may be said, with its equally popular companion tractate, *Rule and Exercises of Holy Living* (1650), to offer a summary of the duties and devotions necessary to a Christian life.

HOLY FAMILY. The name given in art to representations of the Virgin and the Infant Saviour and their relatives, St Joseph or St Elizabeth and the infant John. The earliest such composition is that in the Catacomb of St Calixtus in Rome, with the prophet Isaiah. The Virgin is represented sitting on a seat, which soon became a throne, the traditional attitude up to the Renaissance. The Byzantine school, as early as the sixth century, invented the type in which the Child is seated directly in the centre of the Virgin's lap and is blessing, both figures gazing straight forward. Some of these early pictures were regarded as painted by St. Luke

and endowed with miraculous powers. Such are a number in the churches of Rome (e.g., at San Sisto, Santa Maria Maggiore, etc.) and Venice (e.g., that of St Mark, brought from St Sophia in 1204). Later, this school added attendant angels, who sometimes, as in the school of Crete, bore the emblems of the Passion, the sight of which affrights the Child. The arrangement in which the angels are throne-bearing and adoring figures, in rhythmic arrangement on either side of an immense throne, was developed very beautifully by Cimabue and Duccio in their famous pictures at Florence and Siena. It was quite late in the Middle Ages when other figures were brought into the composition. These were, especially, St Anna, the mother of the Virgin (sometimes holding the Virgin in her lap), St Joseph, and, as playmates to the Infant Christ, the infant John the Baptist (usually in goatskin and bearing a cross), or St Catharine (with whom Christ is being sometimes mystically married). Even the early legendary history of the infancy of Christ has been drawn upon for such scenes as the Twelve Apostles playing with the Infant Christ as boys—a scene peculiar to German art. Of all subjects of Christian art that of the Madonna and Child, comparatively unknown before the thirteenth century, came into overwhelming prominence, becoming the favorite theme of the Italian painters of the Renaissance. One of its variants at that time was the adoring Virgin on her knees before the Infant, a favorite subject with Filippo Lippi. The Holy Family represents a more intimate aspect of the subject, some phase of family life, it must include St Joseph, St Elizabeth, and the infant John—to be distinguished from the Madonna (q.v.) proper, as well as from the more elaborate scenes in which the Virgin and Child, similarly portrayed, are accompanied by several large figures, saints and fathers of the Church, which are not mere accessories of the sacred group, this is usually termed a *Sacra* (or *Santa*) *Conversazione*, and was a popular scene, especially with the Umbrian, Venetian, and northern schools of the fifteenth and sixteenth centuries. Among the distinguished painters who have treated the Holy Family, which was especially popular in the sixteenth century, the first place belongs to Raphael, who often repeated it, and in the example formerly in the Cambrani collection, now at Munich, created the most typical example. Others among the Italians were Bartolommeo, Correggio, Giulio Romano, Leonardo, Michelangelo. It was a favorite subject with Durer especially in his "Life of the Virgin"; with Gerard David and Rubens among the Flemings, Murillo among Spaniards, and Knaus (Metropolitan Museum) among modern Germans. Consult the bibliography of MADONNA, and, for the location of the paintings cited, the articles on the painters mentioned. See PLATES of CORREGGIO, ENGRAVING, GHIRLANDAIO, HOLBEIN, RAPHAEL, ROBBIA, SARTO.

HOLY GHOST, or HOLY SPIRIT. In orthodox theology, the third person of the Trinity (q.v.), "proceeding from the Father and the Son," yet of one substance, majesty, and glory with the Father and the Son, very and eternal God. In early Hebrew thought the Spirit of God was God working in man on special occasions with particular results. It might bring evil as well as good. Both Saul's insanity (1 Sam. xvi. 19) and the work of a prophet (Ezek. ii. 2) might be ascribed to God's Spirit. Later, when noth-

ing evil was ascribed to God, His Spirit of course did only good. In the writings after the exile the term was also used for God working in nature (Job xxxi 13), but this usage did not pass into the New Testament period. By that time the term Holy Spirit was limited to the working of God upon the lives of men. There had long been the conception that when the Messiah came the Spirit would be given more freely (Joel ii 28, 29), and the early Christians, who believed that Jesus was the Messiah, were ready to ascribe the divine guidance of their lives to the Spirit, as the abundant use of the term in the Acts and Paul's letters shows. Paul enlarged the term to mean, not merely the guidance of God in particular events, but the divine basis of the entire Christian life. The term, in its stage of biblical development, expresses the belief that the whole religious life originates from and is guided by God's Spirit acting directly on man's spirit. The proof of this action of God's Spirit lay (1) in the feeling of the man subject to it, (2) in its result, as furthering the recognized plan of God in human life and society.

The history of this term in theology is closely linked with that of Christology. In the Apostolic fathers, God, Christ, and the Spirit are sometimes distinguished, and sometimes the Spirit is made identical with the preexistent Christ. As Greek thought came in, the Spirit and the Logos are often identified (Justin Martyr). The doctrine of the personality of the Spirit followed that of the personality of Christ. Arius held that the Holy Spirit was the first created nature produced by the Son. The clause in the Apostle's Creed, "I believe in the Holy Ghost," probably meant not the personality, but the work of the Spirit—that God's Spirit is active in man. The Constantinople Creed (381), called the Nicene Creed in the Western churches, first expresses the claim of the Spirit to worship. The "procession" (qv) of the Spirit became later one of the chief differences between the Eastern and the Western churches. The "filioque" (qv) clause was inserted in the creed by the third Council of Toledo (589). The orthodox belief regarding the Spirit has been that He is God, but distinct from Father and Son, in the same way as the Son is from the Father, that His function is to carry on the work of God in the hearts of men, by regeneration and sanctification. The doctrine of the Spirit has never been so actively discussed as that of Christ, but it is sometimes held that the Holy Spirit is, in the Bible, merely a name for God acting in the hearts of men, and that the idea of a separate personality is an inference from the person of Christ.

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1908), J. Ainal, *La notion de l'Esprit*, parts 1 and 11 (Paris, 1908-11), H. B. Swete, *The Holy Spirit in the New Testament* (New York, 1909).

HOLY GHOST, ORDER OF THE (Fr. *L'Ordre du Saint-Esprit*). The name of an order of knighthood founded in 1578 by Henry III, King of France, because on Pentecost, 1573, he had been elected King of Poland and on Pentecost, 1574, had succeeded to the French throne. Its purpose was to relieve the poor and infirm and to take care of foundlings. The grand master of the order was always to be the King of France. The insignia were a green cross with eight points, on the obverse of which was a dove turned downward, on the reverse the representation of the archangel Michael, the chain, after Henry IV, bore the lilies of France and the monogram "H". There were 100 knights, without counting foreigners. The order was definitely dissolved on Feb. 10, 1831, by Louis Philippe.

HOLY GHOST, PROCESSION OF THE See PROCESSION OF THE HOLY GHOST.

HOLY GHOST FLOWER, or DOVE FLOWER See HOLY SPIRIT PLANT.

HOLY GRAIL See GRAIL, HOLY.

HOLY GRASS (*Hierochloa odorata*). A grass about a foot high, with a brownish glossy lax panicle. It is found in the north of Europe and throughout North America. It has a sweet smell, like that of sweet vernal grass, and in Iceland, where it is plentiful, it is used for scenting apartments and clothes. In some countries it is strewn on the floors of the places of worship on festival days, whence its name. Its stems are used by North American Indians to weave into their baskets, mats, etc. It is of little value for forage, as stock seem to dislike it. This grass is known by many other names, as vanilla grass, Seneca grass, sweet-scented grass, etc.

HOLY GROTTO. The traditional scene of the Annunciation at Nazareth. Over the grotto stands a monastery, occupying the site of the Santa Casa, the house in which Mary was born, and which was carried by a miracle to Loreto. The grotto is marble-lined and is lighted by nine silver lamps. It is 20 feet square and 10 feet deep.

HOLYHEAD, hōl'i-hēd A seaport of Anglesey, North Wales, situated on Holy Island, 24½ miles west-northwest of Bangor (Map. England, B 3). It is the terminus of the London and Northwestern Railway, and a port for the mail steamers to Dublin, 60 miles distant. It has a celebrated breakwater, 7860 feet long, which forms a government harbor of refuge of 400 acres. It has three lighthouses. Coasting trade, shipbuilding, and rope making are carried on, and there is also some fishing. The town possesses assembly rooms and baths and a picturesque old embattled church. Interesting Roman and early English remains exist in the neighborhood. The United States is represented by a consular agent. Pop., 1901, 10,039, 1911, 10,636.

HOLYHEAD ISLAND A small island of North Wales, west of the island of Anglesey, forming part of the county of that name (Map. Wales, B 3). Its area is about 6000 acres. Pop., 1901, 11,414, 1911, 11,131.

HOLY INNOCENTS' DAY See CHILDRENS' DAY.

HOLY ISLAND, or LINDISFARNE, līn'dis-farn A small island belonging to Northumberland, England, in lat 55° 40' N., long 1° 47' W., 10 miles southeast of Berwick-on-Tweed and 2

miles east of the mainland (Map England, E 1). Area, 1051 acres. It is about 4 miles long and 2 miles broad and is connected with the mainland at low water. The north part is barren and uninhabited, but the south is very fertile. Rabbits, fish, and oysters are exported. On the south coast is the village of Holy Island, much resorted to by summer visitors. On the island are several ruins, the chief of which are the extensive and sombre-looking remains of the famous Abbey of Lindisfarne, originally a Saxon edifice, founded in 635 by St Aidan, the disciple of St Columba. There is also an ancient castle, now fortified. Holy Island flourished under St Cuthbert, who died here in 687. In 793 the abbey was destroyed by the Danes. Consult R Hegge (ed.), *Legend of St Cuthbert with the Antiquities of the Church of Durham* (London, 1663), and Wilson, *Lindisfarne Churches* (1870). Pop., 1901, 405, 1911, 359.

HOLY LANCE See LANCE, THE HOLY

HOLY LAND See PALESTINE

HOLY LEAGUE The name given to a number of political alliances in Europe. Of these the principal were the leagues formed (1) in 1511, by the Pope, Spain, and Venice against France, (2) in 1527, by the Pope, Francis I, and Henry VIII against the Emperor Charles V, (3) in 1538, by Charles V and the Catholic princes of Germany against the Schmalkaldic League, (4) in 1571, by the Pope, Spain, and Venice against the Turks, (5) most important of all, the one formed in 1576 by the Guisces, the Pope, Spain, and the Parlement of Paris against the Huguenots, (6) in 1609 a Holy League (known as the Catholic League) organized by the Catholic states of Germany, with Bavaria at its head, in opposition to the Protestant Union.

HOLY MAID OF KENT See BARTON, ELIZABETH

HOLY MOTHER OF THE RUSSIANS.

An epithet originally given to Moscow, the former capital of Russia, by the masses of that nation and still preserved among the peasantry.

HOLYOAKE, hōl'yōk, GEORGE JACOB (1817-1906). An English writer, lecturer, and reformer, particularly identified with the "cooperative movement." He was born in Birmingham, England, was educated at the Mechanics' Institute there, taught mathematics for a time, and while still young became widely known as a radical in politics and religion, attracting attention in particular by his advocacy of the theories of Robert Owen (qv). He early became especially interested in the theory and practice of cooperation, was active in the movement for the organization of the so-called Rochdale Pioneers in 1843, and subsequently was largely engaged as a lecturer and writer in the interests of cooperation. In 1842 he was imprisoned for six months for blasphemy, his being the last conviction on that charge in England. Soon afterward he devised a moral system, known as secularism (qv), which he advocated in public speeches and in the press. For a time he was president of the London Secular Society, the central organization of secularism. He was instrumental in securing the repeal of the so-called "tax upon knowledge" in 1854. He edited at various times the *New Moral World*, the *Reasoner* (from 1846 to 1866), and the *Cause of the People*, in which he contended vigorously for his views, and published numerous books, including *History of the Rochdale Pioneers* (1857; 10th ed, enlarged, 1893), *The*

History of Cooperation in England (rev ed, 2 vols, 1906), *Life of Joseph Rayner Stephens, Preacher and Political Orator* (1881), *Self Help One Hundred Years Ago* (1890), *The Cooperative Movement To-Day* (1891), *Sixty Years of an Agitator's Life* (1892), an interesting though somewhat rambling autobiography, *Nature and Origin of Secularism, Showing that where Free Thought Commonly Ends Secularism Begins* (1896), *Jubilee History of the Leeds Cooperative Society* (1897), *Bygones Worth Remembering* (1906).

HOLYOKE, hōl'yōk. A city in Hampden Co, Mass., on the Connecticut River, 8 miles north of Springfield, on the Boston and Maine and the New York, New Haven, and Hartford railroads (Map Massachusetts, B 4). It was originally a part of West Springfield and was incorporated as the Third Parish in 1786, though it was commonly called Ireland Parish, from the fact that several Irish families were the first settlers. In 1850 Holyoke was set off from West Springfield and incorporated as a separate town, and in 1873 it was chartered as a city. Its importance as a manufacturing centre dates from 1847, when the Hadley Falls Company began to develop the great natural water power. The river here falls 60 feet and is crossed by a granite dam 1000 feet long and 32 feet high, affording a maximum capacity of 40,000 horse power, the most valuable power in New England. For many years it has been noted for its paper mills. It now has also extensive manufactures of cottons, woolens, thread, silk, alpaca, belting, bricks, screws, wires, machinery, envelopes, and school supplies. It is an important centre for hydraulic engineering, for testing water wheels, etc. It has a public library, a tuberculosis hospital, a city hospital, and the House of Providence Hospital. The Holyoke Scientific Society has done valuable work in American archaeology and has fine collections of Indian antiquities. In the vicinity are many places of scenic interest, notably Mount Tom (1215 feet), ascended by an electric railway from Holyoke, and Mount Holyoke (955 feet). Holyoke is governed under a revised charter of 1896, by a mayor, elected annually, and a city council, two-thirds of whose members are elected at large for two years, the remainder by wards for one year. The subordinate offices are filled as follows: appointed by the mayor—board of public works, fire commissioners, board of health, city marshal and assistants, city solicitor, and inspector of milk, appointed by the mayor with the consent of the council—sealer of weights and measures and inspectors of animals and provisions, elected by the council—water commissioners, city physician, poor overseers, city auditor, and city messengers. The annual income and expenditures of the city in 1912 amounted to \$3,095,000 and \$3,106,000 respectively, the main items of expense being \$79,000 for the police department, including amounts for police courts, jails, etc., \$126,000 for the fire department, and \$290,000 for schools. The city owns and operates its water works and its gas and electric-light plants. Pop., 1870, 10,773, 1880, 21,915, 1890, 35,637, 1900, 45,712, 1910, 57,730, 1914 (U S est.), 62,852. See MOUNT HOLYOKE COLLEGE.

HOLYOKE, MOUNT. A steep ridge of greenstone in Massachusetts, near the east bank of the Connecticut River and about 6 miles due north of Holyoke. It rises 955 feet above sea level (Map Massachusetts, B 3). A carriage

road winds upward to the point where a mountain railway carries passengers for 600 feet up a precipitous incline to a hotel built on the summit in 1821. The view here obtained of the Connecticut River and valley has long been famous as one of the finest in New England.

HOLY ORTHODOX CATHOLIC AND APOSTOLIC CHURCH. The official name of the Eastern church. See GREEK CHURCH.

HOLY PHIAL, BARONS OF THE (Fr *Sainte Ampoule*). Sometimes described as an order of knighthood which formerly existed in France. They were four persons, prominent for rank, family, and fortune in the Province of Champagne. At the coronation of the French kings they were delivered to the dean, priors, and chapter of Rheims, as hostages for the return of the holy phial in which the coronation oil was kept. The phial, according to legend, was brought from heaven by the Holy Ghost in the form of a dove and put into the hands of St. Remigius at the coronation of Clovis (q.v.). The holy phial preserved at Rheims was broken by Ruhl, a member of the Convention, in 1793. The badge of the barons was a cross of gold enameled white, cantoned with four fleurs-de-lis, and on the cross a dove descending with a phial in its beak and a right hand receiving it. An interesting account of the coronation of Louis XIII and of these barons is given in Favine's *Theater of Honour* (London, 1623).

HOLY ROMAN EMPIRE. The name now given to the Empire erected by Charles the Great (q.v.), King of the Franks in western Europe, usually dated from his coronation, at Rome, by Pope Leo III in 800, or, more technically, to this Empire as revived in 962 by Otto the Great (q.v.). In theory the Holy Roman Empire was a continuation of the Western Empire, which was overrun by the barbarians in 476. When Charles the Great was crowned Emperor by Leo III, he thought of himself as the successor of Augustus, Trajan, and Marcus Aurelius, and styled himself Augustus. This theory prevailed throughout the Middle Ages. Louis the Pious, Lothaire I, Louis II, Charles the Bald, and Charles the Fat were crowned as Roman emperors. After the deposition of the latter (887), which was followed by the disruption of the great Frankish Empire, the Imperial title was still held by a few princes, as Arnulf, King of Germany, and Berenger I, King of Italy. In 962 Otto the Great, after wresting the royal crown of Italy from a descendant of Charles the Great, had himself crowned Emperor of the Romans by Pope John XII and inaugurated the Roman Empire of the German nation. From that time the King of Germany was usually Emperor. The Empire consisted of Italy and the lands whose rulers recognized the overlordship of the German monarch, but theoretically the Emperor was the ruler of all Christians in western Europe, and some emperors, as, e.g., Henry VI, dreamed even of a world-wide empire. At different periods the rulers of Hungary, Poland, Denmark, Jerusalem, and Cyprus were to a greater or less extent vassals of the Roman Emperor. Until the reign of Frederick Barbarossa the name had been merely Roman Empire, Frederick added the designation Holy, either to vindicate its sacred character against the exclusive pretensions of the Church or else to describe its chief function as the protection of that Church. By the close of the thirteenth century the authority of the German emperors in Italy was reduced to a mere shadow. At the

close of the fifteenth century the Swiss cut loose completely from the Empire. In the Netherlands the Imperial authority had come to an end long before their connection with the Empire was declared to be severed in an article of the Peace of Westphalia (1648).

The early German kings were elected by the chief men of the nation with the assent of the other freemen. Gradually the chief nobles secured almost entire control of the elections, but there was no fixed mode of procedure. At the election of Lothair in 1125, e.g., a committee consisting of 10 from each duchy was chosen to select an emperor. In the thirteenth century—by a process of evolution, which it is not possible to trace here—the number of electors had been fixed at seven, but there was a dispute as to who were included in the seven. This was settled in 1356 by the Golden Bull of Charles IV, which determined that the electoral college should be composed of the archbishops of Mainz, Treves, and Cologne, the King of Bohemia, the Count Palatine of the Rhine, the Duke of Saxony, and the Margrave of Brandenburg. The Golden Bull also declared that the electoral votes were attached to the office, not to the persons, and descended in the case of the lay principalities by right of primogeniture. This continued to be the constitution of the electoral college until 1623, when Ferdinand II arbitrarily transferred the vote belonging to the Count Palatine to Maximilian of Bavaria. At the Peace of Westphalia (1648) an eighth electorate was created for the Palatinate. In 1692 the ninth electorate, that of Hanover, was instituted. The Imperial elections were held at Frankfort-on-the-Main and the coronation city was Aix-la-Chapelle. The Emperor at some time during his reign went to Rome to receive the Imperial crown at the hands of the Pope. The last ceremony of this kind took place in 1530, when Charles V was crowned at Bologna by Pope Clement VII. The successor elect to the Emperor of the Romans was styled King of the Romans.

During the so-called Interregnum following on the death of the last Hohenstaufen Emperor there was a double election (1257), both Richard of Cornwall and Alfonso X of Castile being made Emperor, one receiving four votes and the other three. Their election may be taken to illustrate the theory held by some at the time, that a man of any nationality might be chosen to the Empire, but their total failure to obtain anything but the mere Imperial title proved that, as a matter of fact, the sovereignty of the Holy Roman Empire could be held only by a Germanic prince. After 1438 all the emperors but two belonged to the house of Hapsburg.

Charles the Great and his immediate successors followed the old German custom of calling together at frequent intervals the nobles and freemen for consultation about the public welfare. As feudalism developed, these assemblies ceased, and the Emperor called together only such of his vassals as he chose. Their meetings were called Imperial diets (*Reichstage*). In the thirteenth century the cities became very influential, and consequently their representatives were summoned to the diets. As the power of the emperors declined, the diets took a more prominent part in the administration of the Empire. Their functions were judicial as well as administrative. In the fourteenth century it came to be fixed that the Diet consisted of the three classes—electors, princes, and representa-

tives of the cities. The lesser nobility had no voice in the Diet. But the power of the Diet was slight, because it was concerned only with Imperial matters, and the Empire had ceased to be of real importance as a factor in European politics. This was clearly shown in 1495, when Maximilian I attempted to unite the Imperial estates against the French invasion of Italy. The Diet which he summoned did nothing to check the French, but with the Emperor's consent created the Imperial Chamber (qv), a supreme tribunal for the preservation of peace within the Empire. It consisted of a president and 16 members, who could not be removed from office. It held its sessions at Frankfort, Speyer, and other cities until 1689, in 1693 it was established permanently at Wetzlar. Gradually the Imperial Chamber became an important factor in the maintenance of peace within the Empire. The Emperor was jealous of it, as he had no control over it. Consequently he attempted to transfer some of its authority to the Aulic Council (qv)—a somewhat similar body for Austria, which was under his control. During the first half of the sixteenth century the Aulic Council interfered in the affairs of Italy, the Netherlands, and other portions of the Empire. After that time, however, it was again restricted to Austrian interests alone.

The Empire came to an end in 1806, when Francis II resigned the Imperial crown after having assumed (1804) the title of Emperor of Austria. After the time of the Hohenstaufen, whose dynasty came to an end in 1254, the Empire rapidly sank in importance and owed any real authority which it possessed to the strength of the ruler who was Emperor. Still the possession of the title gave some additional prestige. By the Peace of Westphalia (1648) the bonds which held the Empire together were greatly loosened, the right being accorded to the individual states to enter into foreign alliances. In the eighteenth century Voltaire said of the Holy Roman Empire that it was neither holy, nor Roman, nor an empire. During its earliest existence, however, it was a very important factor in the history of Europe. Consult Karl Biedermann, *Deutschland in achtzehnten Jahrhundert* (3 vols, Leipzig, 1867-80), Shailer Mathews, *Select Medieval Documents and Other Material Illustrating the History of the Church and Empire, 754-1254 A.D.* (2d ed., New York, 1900), W. F. Butler, *Lombard Communes* (ib, 1906), William Stubbs, *Germany in the Middle Ages* (ib, 1908), James Bryce, *The Holy Roman Empire* (ib, 1909), Herbert Fisher, *The Medieval Empire* (2 vols, ib, 1909), Karl Hampe, *Deutsche Kaiser Geschichte in der Zeit Salier und Staufer* (2d ed., Leipzig, 1912). See GERMANY, ITALY, and the articles on the individual emperors, with the books cited.

HOLYROOD (hól'í-rood) **PALACE.** The former residence of the Scottish kings in Edinburgh. It was rebuilt between 1671 and 1679 by King Charles II of England from the designs of Sir William Bruce of Kinross, after the destruction by fire in 1650 of the prior palace built by James IV. It occupies the site of the famous Augustinian Abbey of the Holy Rood erected by King David I in 1128, at the place where, according to a fabulous story, he was miraculously saved from the attack of a hunted stag by the interposition of the lost holy cross or rood which fell from the stag's antlers into the King's hands, and at the sight of which the animal

turned and fled. The black rood of Scotland, as it was called, was brought to Scotland by St. Margaret about the year 1070 and became one of the kingdom's heirlooms. It is known to have fallen into the hands of the English at the battle of Neville's Cross in 1346, but its disappearance in course of time gave currency to the above fable. The sole remains of the abbey are the ruins of the church, which anciently was a safe refuge for criminals and remained so for debtors until the abolition of imprisonment for debt in 1880. Holyrood is interesting as the scene of many historical events, including the term of Queen Mary's residence and of Rizzio's murder in 1566. It is the occasional residence of the British sovereigns and since the death of Queen Victoria has undergone thorough renovation. Consult Charles Mackie, *Original Historical Description of the Monastery, Chapel Royal, and Palace of Holyrood House* (9th ed., Edinburgh, 1832); Daniel Wilson, *Memoirs of Edinburgh* (ib, 1848), J. H. Burton, *The History of Scotland* (ib, 1870), F. W. Watkeys, *Old Edinburgh* (New York, 1913).

HOLY SEPULCHRE. The place where Jesus was entombed. According to the New Testament data the sites of the crucifixion and burial of Jesus were not far apart (John xix 41), outside Jerusalem (Heb. xiii 12), and near a road (Mark xv 29, Matt. xxvii 39). The tomb itself was in a garden (John xix 41) and apparently on a slope. The place of crucifixion was called Golgotha (Mark xv 22, Matt. xxvii 33, John xix 17), an Aramaic word meaning 'skull'. Calvary is but the anglicized form of the Latin *calvaria*, skull. There is no evidence for supposing that the locality was sufficiently elevated to be called a hill or mount. The Gospels imply that the site was well known when they were written, but the references are not full enough to make a modern identification easy or certain.

The traditional site of both Golgotha and the tomb of Jesus is that now covered by the church of the Holy Sepulchre, 400 to 500 yards west of the northern part of the Haram esh-Sherif, or temple area, and well within the modern city of Jerusalem. Here Constantine the Great built a beautiful church on the spot then supposed to be the place of the Resurrection. This identification was not seriously disputed until Jonas Korte, in 1741, claimed that, being within the city walls, it could not be correct. Korte supposed that the modern north wall was in existence at the time of the crucifixion, but in fact it was built later. In 1841 Edward Robinson, in his *Biblical Researches*, disputed the correctness of the traditional site, on the supposition that the second wall of Josephus—which was the outer wall in Christ's day—passed to the north of it, and in that case the traditional site must have been within the city. Since Robinson, this has been considered by many to be the chief and fatal obstacle to the view that the modern church actually covers the spot where Jesus was buried. But the excavations and measurements of Conrad Schick (1888 and later) strongly support the view that the wall in Christ's day lay south and east of the disputed site, which therefore was outside the city and may well have been the scene of the crucifixion and burial. Of other proposed sites, two—both outside the modern city, near the Damascus Gate—have received strong support. The question is still unsettled, but the drift of competent opinion is towards

provisional acceptance of the traditional view until more decisive evidence compels its rejection.

A few years after the crucifixion the northern area of Jerusalem was inclosed by a third wall, as it was becoming thickly settled. There is no reason to suppose that the early Christians forgot where the crucifixion and burial had occurred, though there is no probability that they venerated the place as holy. In the Jewish war with Rome (66-70) this part of the city was occupied by the Roman army preparatory to the assault on the second wall. From its capture by Titus (70) to the rebellion of Bar-Cochba (132-135), the city was practically in ruins, though not entirely desolate. After suppressing this rebellion Hadrian rebuilt Jerusalem as a heathen city, calling it *Ælia Capitolina* and absolutely forbidding Jews to enter it. On the site of the temple a shrine to Jupiter was built, and on that of the supposed tomb of Jesus a temple to Venus was erected (by Hadrian or one of the later emperors). Incidentally this may be evidence that even then Christian tradition pointed out that spot as worthy of veneration. In the third century the holy places of the city and vicinity began to attract pilgrims from various parts of the Empire, though there is no evidence that any visited this particular spot. In the fourth century the pilgrimages became more popular, and when through Constantine I the Empire became nominally Christian, it was but natural that the Emperor, urged on, doubtless, by his mother, determined to rescue the holy sepulchre from oblivion and disgrace. What guided Constantine in selecting this spot was, without doubt, the tradition already current. On removing the accumulated rubbish the workmen came upon a rock tomb. So astonishing was this coincidence that it was counted as simply miraculous that the precious grave, so long hidden away, should at last have come to light. Legends soon began to multiply—e.g., that Helena, Constantine's mother, miraculously discovered the true cross near by, of which Eusebius, the contemporary and well-informed witness, says nothing (See CROSS, INVENTION OF THE). Constantine now built here a magnificent church. Over the grave was erected a beautiful gilded dome open to the sky, supported by columns and surrounded by a wall, the inside diameter being about 65 feet. From the rotunda eastward extended the basilica, 250 feet in length, with its nave and two aisles, the nave ending in a semicircular choir. Still farther to the east, connected with the basilica by three gateways, was the atrium, surrounded with colonnades and containing basins for the customary ablutions. From the atrium three gates led out into the propylæum, which connected the whole edifice with the market street to the east. The entire length of the church or cathedral so constructed was about 475 feet. It was due, doubtless, to the necessities of the situation that the propylæum and atrium were to the east rather than, as usual, west of the basilica. In the south aisle a knob of the native rock, with a cleft in it (the grave of Adam, according to legend), rose a few feet above the level of the floor, inclosed within a silver fence. This was supposed to be the rock in which the cross was set,—i.e., Golgotha proper. In 336 A.D., 10 years after its foundation, Constantine's church was dedicated by the Synod of Tyre. For nearly 300 years the edifice remained intact, famed for its beauty, one of the chief attractions for the numerous pilgrims constantly

visiting Jerusalem. During this period legends grew apace, and numerous miraculous events were associated with the locality. In 614 the church was destroyed, at least partially, by the Persians under Chosroes II. Steps were taken at once by Modestus, acting Bishop of Jerusalem, to rebuild the edifice, and after 10 years' labor (616-26) the work was completed. The new buildings were not of the same plan or dimensions or beauty as their predecessor. The rotunda was rebuilt as a separate church—of the Resurrection—and on the site of the large basilica of Constantine a smaller one, the *Martyrium*, over the place where the cross was said to have been found, was erected. Southeast of the rotunda a new church in honor of the Virgin was built, while over Golgotha, now outside of the basilica, a chapel was placed. These edifices remained, with occasional damage and consequent repairs, until their destruction by Hakim, Caliph of Egypt, in 1010. With the assistance of the Byzantine Emperor they were restored in 1048, with some changes of plan. In 1140 the Crusaders began a general rebuilding of all the edifices on a larger scale. The new church was dedicated July 15, 1149, but not completed until 1168. The church of the Crusaders was destroyed in 1244, but again rebuilt (c 1300). Extensive alterations and improvements took place in 1555 and 1719. In 1808 the rotunda was burned and much other damage done to the western buildings. The restoration, the work of the Greeks and Armenians, was completed in 1810. Since that time, with the exception of the renewal of the dome in 1865 by Napoleon III and Alexander II of Russia, the buildings have undergone no serious alteration.

For plan of the present buildings, with extended descriptions, consult Baedeker's *Palestine and Syria* (New York, 1912), for the plan and extent of the buildings of Constantine, consult Carl Mommert, *Die heilige Grabeskirche zu Jerusalem in ihrem ursprünglichen Zustande* (Leipzig, 1898), or the *Survey of Jerusalem*, published by the Ordnance Survey, for the best bibliography, Hermann Guthe's article in the *Hauck-Herzog Realencyklopädie* (Leipzig, 1899). Consult also C. W. Wilson, *Golgotha and the Holy Sepulchre* (London, 1906), and G. A. Smith, *Jerusalem*, vol. 1, pp. 247 ff. (New York, 1908).

HOLY SEPULCHRE, KNIGHTS OF THE An order of knighthood instituted (1496), probably by Pope Alexander VI, for the guardianship of the Holy Sepulchre and the relief and protection of pilgrims. The Pope was originally the grand master, but he subsequently ceded his rights to the Guardian Father of the Holy Sepulchre at Jerusalem. The knights were held to strict rules of honor, faith, and purity, but in return they had the most unusual and extraordinary privileges conferred on them. They were exempt from taxation, could marry, as an organization could possess property, could legitimize bastards, and could cut down and bury the bodies of criminals who had been hanged. After a temporary union with the Hospitalers, the order was reconstructed in 1814, both in France and in Poland, and is still in existence, its members being chosen by the Guardian of the Holy Sepulchre out of noble and devout pilgrims. The badge of the order consists of a Jerusalem cross of red enamel, with four smaller Latin crosses between its arms, surmounted by a crown and held by a black ribbon. The collar is made up of small crosses like the badge.

HOLY SPIRIT. See HOLY GHOST.

HOLY SPIRIT PLANT, or DOVE PLANT A name given to a species of orchid, *Peisteria elata*, found in Central America, especially in the vicinity of Panama. It is an epiphytic orchid, with large striated green pseudobulbs, which bear three to five lanceolate leaves, often a yard long and 6 inches across. The flower stem springs from the base of the pseudobulbs and is 4 to 6 feet high, a third of its height bearing creamy-white, fragrant flowers, an inch or more in diameter, the inner part of which is often tinged with crimson or other shades of red. The name is derived from the shape of the united column of style and stamens. This column resembles a conventional dove hovering with expanded wings in the vase formed by the petals. It is used in religious festivals in Central America as symbolical of the Holy Spirit, hence its name "el espíritu santo." See GROUND.

HOLY STONE A miraculous rock at Ardmore, Ireland, which is said to have floated from Rome with robes, a bell, and a lighted taper for St. Patrick.

HOLYSTONE A piece of soft stone, usually sandstone, used in scrubbing decks. To holystone a deck is to scrub it, using holystones. Holystones are smooth on one side at least and have a small depression on the other to receive the end of a handle or stick by which they are pushed back and forth. To increase the scrubbing power of the stones, the decks are wetted and sand is sprinkled over them prior to holystoning. The derivation of the term is supposed to be from the fact that holystoning used chiefly to be done on Saturday as a preparation for Sunday inspection, church, etc.

HOLY THURSDAY See ASCENSION DAY, HOLY WEEK, MAUNDY THURSDAY.

HOLY WAR See AMPHICTYONIC COUNCIL, SACRED WARS.

HOLY WAR, THE 1 The first of Thomas Fuller's historical writings (1639). It is a history of the Crusades and was very popular up to the time of the Restoration. 2 A religious allegory, explained on the title-pages as "made by Shaddai upon Diabolus," by John Bunyan (1682).

HOLY WATER (Lat. *aqua benedicta*) Water blessed by a priest for religious uses and employed in the Roman Catholic and Oriental churches. In most ancient religions the use of lustral or purifying water not only formed part of the public worship, but also entered largely into the personal acts of sanctification prescribed to individuals. The Jewish law contained many provisions to the same effect, and Christ, by establishing baptism with water as the necessary form of initiation into the religion instituted by Him, gave His sanction to the use. The usage of sprinkling the hands and face with water before entering the sanctuary, which was prescribed in the Jewish law, was retained, or at least very early adopted, in the Christian Church. It is expressly mentioned by Tertullian in the end of the second century. Water was used for the exorcism of evil spirits. St. Jerome mentions the blessing of water, and the Apostolic Constitutions contain a formula for the purpose. That now given in the Roman missal and ritual has been preserved unaltered from the sacramentary of St. Gregory. It includes an exorcism (qv.) and the admixture of salt which has been blessed. The water so prepared is sprinkled by the priest on the congregation before high mass (this rite being called the *asperges*, from the first word of

the anthem which is sung during its progress), and is publicly employed as part of the rites for funerals and for the blessing of various objects and persons, that used in the consecration (qv.) is prepared in a special manner. The ordinary holy water is also used privately by devout Roman Catholics on entering and leaving the church and at other times. It is considered by them as included among sacramentals (qv.). The original idea of purification became early in the history of religion, symbolic of spiritual cleansing, but Christian devotion assigned another potency to blessed water accompanied by special invocation, that of casting out evil spirits. Although it is difficult to fix the precise time, it cannot be doubted that the practice of mingling salt with the water is of very ancient origin, perhaps with the idea of adding to the magical power of the water.

HOLY WATER VASE, or STOUT A receptacle, known in France as *brûtière*, for holy water, placed at the entrance of Roman Catholic churches, so that those who come in or go out may dip their fingers in it and cross themselves. It is frequently in the form of a shell and usually attached to the wall. The kind of vessel known as *pila* in Italy stands on a base of its own. The artists of the Italian Renaissance produced exquisite examples of both types, especially of the *pila*, as in Siena Cathedral. The two holy water stoups in St. Peter's at Rome are huge marble shells, held each by a colossal infant figure.

HOLY WEEK. The week immediately preceding Easter and especially consecrated to the commemoration of the passion of Christ. The observance of the week can be traced back at least to the fourth century. In the Roman Catholic church the special characteristics of the celebration of the Holy Week are increased solemnity and gloom, penitential rigor, and mourning. If any of the ordinary Church festivals fall therein, it is transferred till after Easter. All instrumental music is suspended in the churches, the altars are stripped of their ornaments, the pictures and statues are veiled from public sight, manual labor, although it is no longer entirely prohibited, is by many persons voluntarily suspended, the rigor of fasting is redoubled, and almsdeeds and other works of mercy sedulously enjoined and practiced. All Church services of the week, moreover, breathe the spirit of mourning, some of them being specially devoted to the commemoration of particular scenes in the passion.

Palm Sunday (qv.) commemorates the triumphal entry of Christ into Jerusalem and is observed by the blessing of palm branches, which are carried in the procession as they were by the people of Jerusalem on that day. Spy Wednesday is the old English name for the day which commemorates the betrayal of Christ by Judas. Holy Thursday (also called Maundy Thursday, qv.) is the commemoration of the Last Supper and the institution of the Eucharist. With this in mind, white vestments are worn at the mass (only one mass is celebrated on this day), after which the altars are solemnly stripped and washed by the clergy. (See also FOOT WASHING.) The matins of the last three days, generally sung on the preceding evening (see LENEAGE), constitute an impressive service. On Good Friday the mass is not celebrated, the day being the commemoration of the one sacrifice of the great High Priest, but a special service is held,

called the "mass of the presanctified," including the communion of the priest from the host reserved from the previous day on the 'altar of repose," but without the prayer of consecration or the words of institution (For the ceremony of the "adoration of the cross," see CROSS.) Holy Saturday was in the earliest times set aside for the solemn administration of baptism and orders, the present services of the day begin to partake of the gladness of Easter (q v). In the Anglican communion the observance of the week in a similar spirit is prescribed, and the Scripture selections all have a bearing upon the events commemorated. Good Friday is a legal holiday in England and Ireland. The observance of Holy Week is largely increasing, even among the nonliturgical denominations throughout the English-speaking world. For old English customs, consult Chambers, *The Book of Days*, March 20-28 (London, n d). For the Catholic ritual, consult Thurston, *Lent and Holy Week* (ib, 1904), Duchesne, *Christian Worship* (ib, 1906), Hellner, *Heortology* (ib, 1908).

HOLYWELL, hól'wél. A market town and parliamentary borough in Flintshire, North Wales, 4½ miles northwest of Flint (Map England, C 3). It has limestone quarries, coal, lead, copper, and zinc mines, and numerous establishments for smelting, manufacturing shot, zinc, brass, leather, flannel, cement, cottons, galloons, paper, and beer. Holywell owes its origin to the renowned well of St Winifred, which is said to be the most copious spring in Britain, giving forth at the rate of 21 gallons a minute. Its waters were believed to be efficacious in curing diseases and are still resorted to by Roman Catholic pilgrims. The well is covered by a fine Perpendicular chapel attributed to Margaret, mother of Henry VII. In the vicinity are remains of the old Saxon abbey of Basingwerk, and in the town is St. Bueno's College for Roman Catholic priests. Pop., 1901, 2652; 1911, 2549.

HOLYWOOD, JOHN OF. See SACROBOSCO.

HOLZ, hólts, ARNO (1863-) A German poet and critic, born at Rastenburg. In 1882 he published a volume of poems, *Klingensherz*, which won the Augsburg Schiller prize. In *Deutsche Weisen* (1884), written with Jerschke, and in the *Buch der Zeit* (1885 and 1892), his extremely modern tendency appears, and the attention to details and the attempt at photographic realism (under the influence of Zola) are carried even further in *Neue Gleise* (1892), in which he collaborated with Johannes Schlaf. His realistic theory is further illustrated in the plays *Socialaristokraten* (1896) and *Die Blechschmiede* (1902) and is defended in *Die Kunst, ihr Wesen und ihre Gesetze* (1891 et seq.) and *Revolution der Lyrik* (1899). His latest work comprises *Lieder auf einer alten Laute* (1903) and *Dafnis* (1904) and, with Jerschke, the drama *Traumulus* (1904, 10th ed., 1905), *Frei!* (1905), comedy, *Sonnenfinsternis* (1908), tragedy, *Buul* (1911), comedy, in collaboration with Jerschke, *Ignorabimus* (1913), tragedy. Consult F. Servaes, *Preludien* (Berlin, 1899), Karl Strobel, *A Holz und die jungstdeutsche Bewegung* (ib, 1902), R. Röss, *A Holz* (ib, 1913).

HOLZSCHUH, hólts'shōō, DIETRICH. A German pretender, also called **TILE KOLUP**. He laid claim to the throne as Frederick II, who died in 1250. In Cologne (1284) his claim was ridiculed; he was ducked in a sewer and driven from the city. At Neuss he fared better, because he was looked upon as a powerful magician. In

1285 he went to Wetzlar and there held court, but on the approach of Rudolf he was turned over to the King and was hanged as a heretic (1285). Consult Meyer, *Tile Kolup* (Wetzlar, 1868), and Petri, "Der falsche Friedrich," in vol. II of *Zeitschrift des bergischen Geschichtsvereins* (Bonn, 1864).

HOMAGE, hóm'aj (from OF *homage*, *homage*, Fr *hommage*, Prov *homenatge*, *homenage*, from ML *hominaticum*, homage, from Lat *homo*, man). In the feudal system, the ceremony whereby a tenant in chivalry or by knight's service completed his investiture and thus became entitled to the lands of which he was enfeoffed by his lord, or which fell to him by inheritance. The form was ordinary as follows. The vassal knelt before his lord, placed his hands between his lord's hands, and declared himself the lord's vassal for his fief. The lord then gave him a kiss and raised him from his knees. Homage and fealty (q v) were usually parts of the same ceremony, but were not synonymous. Homage was always due to the immediate lord of whom the land was held. It consisted in an oath of allegiance wherein the vassal declared himself the lord's man (*homo*) and devoted himself to the lord's service "of life and limb and earthly obedience." It differed from fealty in that it was exacted only of military tenants, while fealty was due from socage tenants as well, and in the further fact that fealty was accounted a service, or obligation, by which the tenant held his land (a tenant was sometimes said to hold by fealty in lieu of all other services), whereas homage was not a specified service to be rendered by the tenant for his land, but an incident of the more honorable tenure of knight's service. However, there was probably little difference in the form of oath required in the two cases. With the other incidents peculiar to military tenure, homage was abolished by statute in 1660 (12 Car II, c. 24), but fealty survived as a feature of socage tenure, though it has fallen into disuse.

In modern English law the term "homage" is still employed to denote the oath of allegiance taken by the nobility on the coronation of a new sovereign as well as the oath taken by a newly appointed bishop or archbishop. Consult Luchaire, *Manuel des institutions françaises* (Paris, 1892). See **FEDERALISM**.

HOMAGE ANCESTRAL. An ancient form of English land tenure of a privileged character. It was a form of the tenure of free and common socage (q v) and existed "where time out of mind a man and his ancestors had held by homage" only, in lieu of all other services. The alienation of an estate held by homage ancestral converted it into an ordinary socage tenure by homage and freed it from the peculiar privileges which attached to it by virtue of its ancestral character.

HOMALONOTUS (Neo-Lat, from Gk *ὁμαλός*, *homalos*, level + *νότος*, *nōton*, back). A genus of fossil trilobites of large size, found in the Silurian and Devonian rocks and characterized by the absence of trilobation of the thoracic segments. See **TRILOBITE**.

HOMALOP/SIDÆ. See **HERPETON**.

HOMATROPINE (from Gk *ὁμός*, *homos*, same + Eng *atropine*, from Neo-Lat *atropina*, from *Atropa*, deadly nightshade, from Gk *Ἀτρώπος*, *Atropos*, name of one of the Fates, the inflexible, from *α*, *a*, not + *τρεπός*, *tropos*, a turning, from *τρέπειν*, *trepein*, to turn). A by-product in the manufacture of atropine, used

chiefly for paralyzing the accommodation and dilating the pupil for purposes of examination. For this purpose the hydropiometate, which is freely soluble in water, is employed. Its action is similar to that of atropine, but less powerful and of shorter duration. The dilatation of the pupil passes off in from 24 to 36 hours, while that resulting from atropine lasts several days. Homatropine is often combined with cocaine when used for dilating the pupils. For internal use it is inferior to atropine.

HOMBERG, hōm'bĕrk, WILHELM (1652-1715). A Dutch naturalist and chemist, born at Batavia, Java. He studied law at Jena and Leipzig, and, having graduated in medicine at Wittenberg, practiced at Paris in 1682-85 and after 1691 and at Rome in 1685-90. He is remembered chiefly for his discovery of boric acid in 1702, but he made several other important contributions to chemistry and physics.

HOMBURG. See HESSE-HOMBURG.

HOMBURG, PRINCE OF. See FREDERICK II.

HOMBURG VOR DER HOHE, hōm'būrk fōr dēr hē'e. A fashionable watering place, largely frequented by English, in the Prussian Province of Hesse-Nassau, situated at the foot of the Taunus Mountains, 11 miles northwest of Frankfurt (Map Germany, C 3). Towering above the older section of the town is an old castle which formerly belonged to the landgraves of Hesse-Homburg and is now used by the Prussian royal family. The new town was founded by the Landgrave Frederick II. The landgraves resided here from 1680 to 1866. The old Kurhaus contains a museum of antiquities. The splendid gambling resort here was closed in 1872. The chief of the eight mineral springs is the Elisabeth-Brunnen, the water of which is very rich in salts and is extensively exported. Other springs are rich in iron, and the waters of several are used only for bathing. The annual number of guests exceeds 14,000. Homburg has manufactures of machinery, soap, leather, hats, noodles, iron, castings, paper boxes, vinegar, mustard, and white lead. Pop., 1900, 9635, 1910, 14,344. The environs are delightful. The remains of extensive Roman intrincements are to be seen in the vicinity.

HOME, DANIEL DUNGLAS (1833-86). A Scottish spiritualist medium, born near Edinburgh. He was descended on his mother's side from a Highland family noted for its gift of "second sight." When a child, he was brought to the United States, and before he was 20 he was widely known as a medium. On the testimony of William Cullen Bryant, Professor Wells of Harvard, and other well-known men, it is recorded that knocking on the walls, the sliding about of the furniture, and the "levitation" of the medium himself in the air occurred without the slightest recourse to trickery so far as they could observe. When he returned to England in 1856, his sittings were attended by many prominent people, including Robert Browning and his wife. Mrs. Browning is said to have believed in spiritualism, but her husband disbelieved, and was inspired to write *Mr Sludge, the Medium*. In 1856 Home became a Catholic while at Rome, but in 1864 was expelled from the city as a sorcerer. Dr. Robert Chambers and Dr. Lockhart Robertson were among his converts, and a number of scientists were convinced of the genuineness of his powers, including Sir William Crookes, who published an account of the experiments made with him, entitled *Re-*

searches in the Phenomena of Spiritualism (1874). In 1866 Home became secretary of the Spiritual Athenæum for the propagation of spiritualism. He instituted a vigorous campaign against professional mediums and scrupulously abstained from taking money at his seances. He published *Incidents in my Life* (2 vols., 1863-72) and *Lights and Shadows of Spiritualism* (1877). Consult Madame Home, D. D. Home *His Life and Mission* (London, 1888) and *The Gift of D. D. Home* (ib., 1890).

HOME, SIR EVERARD (1756-1832). An English surgeon, born at Hull, the son of an army surgeon. He studied at Westminster School and in 1773 resigned a scholarship in Trinity College, Cambridge, to study under John Hunter (qv), who married Home's sister. Home was long connected with the College of Surgeons, was chosen its professor of anatomy and surgery in 1804, member of its court of examiners in 1809, master in 1813, and its first president in 1821. He was censured bitterly for burning Hunter's valuable manuscripts, of which he was custodian, and for using them in his work on *Comparative Anatomy* (1814-23), which gains what value it has from the source employed. Among Home's other writings are *The Properties of Pus*, which won a gold medal from the Lyceum Medicum Londinense (1788), a biographical notice of Hunter, prefixed to Hunter, *On Blood, Inflammation, and Gunshot Wounds* (1794), *Practical Observations on the Treatment of Strictures in the Urethra and Esophagus* (1795), *Observations on the Treatment of Ulcers on the Legs* (2d ed., 1801), *Practical Observations on the Diseases of the Prostate Gland* (1811-18), *On the Formation of Tumors* (1830).

HOME, HENRY, LORD KAMES (1696-1782). A Scottish judge and author, born at Kames. He entered the bar in 1724, was raised to the bench in 1752, with the title of Lord Kames, and was made one of the lords of judiciary in 1763. As a coarse but able judge, he is mentioned by Scott in *Redgauntlet* (chap. 1). In 1728 he published *Remarkable Decisions of the Court of Session from 1716 to 1728*. The materials for this work were in 1741 embodied in his *Dictionary of the Decisions of the Court of Session* during its whole history. He is best known, however, by *Essays on the Principles of Morality and Natural Religion* (1751), containing a solution of the question of human freedom, which brought on him the suspicion of infidelity, *Introduction to the Art of Thinking* (1761) and, above all, the celebrated *Elements of Criticism* (1762), the work on which his fame now chiefly rests. In 1774 appeared his *Sketches of the History of Man*. While thus occupied with judicial and literary labors, he took a very active interest in agriculture, writing a useful tract entitled *The Gentleman Farmer Being an Attempt to Improve Agriculture by Subjecting it to the Test of Rational Principles* (1776). His last work, *Loose Thoughts on Education* (1781), was written in his eighty-fifth year. Consult Lord Woodhouselee (A. F. Tytler), *Memoirs of the Life and Writings of Home* (Edinburgh, 1807).

HOME, JOHN (1722-1808). A Scottish dramatist, born at Leith. He was educated at the University of Edinburgh and prepared for the Church. During the uprising of 1745 he fought as volunteer on the Hanoverian side. In 1747 he became minister of Athelstaneford in East

Lothian, where he wrote his famous tragedy of *Douglas*. Performed at Edinburgh in 1756 and at London in 1757, it was received with enthusiasm. For his plot Home used the popular Scottish ballad of *Childe Maurice* and in a less degree Shakespeare's *Othello*. The play, though turgid in diction, has great merits. It was the best English tragedy since Otway. The clergy of the Scottish Kirk, opposed to the theatre on principle, were scandalized by the production. After a bitter controversy Home resigned his charge (1757). He became secretary to Lord Bute, tutor to the Prince of Wales (afterward George III), and received liberal pensions. In 1770 he married and returned to East Lothian and after a time settled in Edinburgh. Besides *Douglas*, Home wrote other plays, which either failed or met with moderate success. Among them are *Agis* (produced 1758 at Drury Lane), *Aquilon* (1760), *Fatal Discovery* (1769), *Alonzo* (1773), *Alfred* (1778). He also wrote a *History of the Rebellion of 1745* (1802). Consult *Works*, with memoir by Henry Mackenzie (Edinburgh, 1822), Wilson, *Poets and Poetry of Scotland* (London, 1875), Francis Espinasse, in *Dictionary of National Biography*, vol. xxvii (ib., 1891).

HOME, SIR PATRICK See **HUME, SIR PATRICK**

HOME AS FOUND. A novel by J. Fenimore Cooper (1838). It is a sequel to *Homeward Bound*.

HOME ECONOMICS treats of the materials used in the home and of its economic and social interests and activities, all considered in their practical and also in their scientific aspects. Its content has been drawn from many sources, including experience and the results of research in various fields of knowledge. As a subject of study, it has only recently been systematically formulated, and its terminology is therefore not entirely uniform. It has been called home science, domestic science, household economics, household science, household arts, and domestic economy. There is a tendency at present, however, to use these various terms to designate special branches of the subject and to use "home economics" to cover the whole field. In support of this usage it is said that the word "home" has immaterial as well as material implications, while the kindred words have not, and that it may stand not only for the household and the roof which shelters it, but also for the centring points of the affections, and, further, that economics (*oikos*, the house or household, *nomos*, law) of the old Greek writers carries not only its modern meaning, but also its original significance, viz., the art of wise and systematic household management.

Home economics, like agriculture and engineering, is a complex. Grouped about it and only imperfectly marked off from it are history, economics, sociology, aesthetics, mathematics, physics, hygiene, chemistry, physiology, biology, and other subjects. From all of these it draws information for the solutions of its own problems, which in general concern four main topics—food, clothing, shelter, and home management. In one form or another its problems have engaged thought and labor since home life first developed from the barbarism which preceded it. Even their formulation dates far back, for Xenophon's *Oeconomicus* deals didactically with the management of a farm and household. As a subject for formal instruction, however, home

economics is of much more recent origin. Records, though imperfect, show that it had its beginning in the Western Hemisphere in the middle of the seventeenth century, when the nuns in Quebec gave instruction in needlework, knitting, and household tasks to groups of girls. Regular class instruction in cooking seems to have been given in Edinburgh as early as 1835. For a long time formal instruction was confined to cooking, sewing, and housekeeping. These became a part of public-school instruction in the United States as early as 1876, being introduced first in the Eastern States. The work in colleges, on the other hand had its origin in western United States, where the influence of State universities and agricultural colleges was pronounced.

State institutions in Iowa, Kansas, and Illinois were the pioneers in college work in home economics. Some confusion exists as to dates, but Iowa seems to have been (in 1869) first in the field with domestic-science instruction, which was, however, not permanent. The early seventies witnessed a new beginning there, destined to lead to uninterrupted development, and also the beginnings of work in Kansas and Illinois. In these and other Western institutions home economics proved itself to be mentally nutritive and not simply a form of vocational training as some of its opponents had maintained. With the realization of its educational possibilities when rightly combined and correlated with other work, came the recognition in other localities of its great educational importance, and many women's colleges and coeducational institutions throughout the United States have opened their doors to it. Many other colleges which do not offer instruction specifically designated as home economics offer courses in hygiene, sanitation, food chemistry, and other subjects which are foundational to a well-rounded course in home economics, but which were not formerly a part of higher education of women.

Interest in the teaching of home economics has grown very rapidly during the last 25 years. It is now taught in 140 or more colleges and universities, in many normal and high schools in the United States, as well as in technical, vocational, and trade schools. A similar development may be noted in Canada. In Great Britain and on the Continent it forms a part of the general plan of education. Up to the present the work has been confined chiefly to secondary and technical schools and extension education. However, interest in the subject in its relation to higher education is increasing.

Courses of instruction in home economics may be cultural, technical, or vocational, elementary, secondary, or advanced. Advanced cultural courses deal chiefly with historical, economical, and sociological data, and with the sciences that are applied in household processes and problems. Technical courses lay special stress upon the problems of household management in order to develop special proficiency in the profession of teaching home economics or in managing homes or institutions. Vocational or trade courses deal chiefly with the manufacturing processes carried on in the home. Elementary courses usually take the form of manual training and are designed to have general educational value and also to be useful in a practical way to pupils who must leave school early.

Original investigation in connection with the

teaching of home economics has so far been concerned chiefly with the functions and uses of food, with hygiene, and with economics. The hygienic and economic problems which clothing and shelter present have been little investigated, but even in these matters the value of careful laboratory research is coming to be recognized.

Though late in its development in pedagogical form, home economics, like other branches of education, has its general and specific literature, its textbook and periodical literature, in addition to its empirical knowledge gained in the past and handed on from generation to generation. It has also its associations and gatherings for counsel and progress. An International Bureau has been established in Fribourg, Switzerland, to collect the literature of the subject and to serve as a clearing house for information. See ADULTERATION, COOKERY, FOOD, FOOD PRESERVATION, FISH AS FOOD, FIRELESS COOKER, FRUIT, MEAT, MILK, PORK, VEGETABLES, and similar topics. See also MANAGEMENT, HOME AND INSTITUTION, TEXTILES AND CLOTHING, COSTUME, DRESS EMBROIDERY, FASHION, GLOVE, JEWELRY, LACE, SHOES, ETC. See SHELTER AND HOUSING, ARCHITECTURE, BUILDING, FURNITURE, HEATING AND VENTILATION, PLUMBING.

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HOMEL, hómél. A town of Russia. See GOMEL.

HOMER. A city and the parish seat of Claiborne Parish, La., 45 miles (direct) east by north of Shreveport, on the Louisiana and Northwest Railroad (Map Louisiana, C 1). It is the commercial centre for a productive cotton-growing district. The water works and electric-light plant are owned by the city. Pop., 1890, 1132, 1900, 1157, 1910, 1855.

HOMER. A village in Cortland Co., N. Y., 34 miles south of Syracuse, on the Delaware, Lackawanna, and Western Railroad (Map New York, D 5). It is in a fertile farming and dairying region, has a canning factory, and manufactures shirts, carriages, fishing lines, and sleighs. The village contains Homer Academy, the county home for aged women, and a public library. The water works are municipally owned. Pop., 1900, 2381, 1910, 2695.

HOMER (Lat. *Homerus*, from Gk. *Ὅμηρος*). The less critical of the ancients attributed to Homer, who was to them a real person, many minor poems, as the *Hymns*, the *Margites* (qv), the late *Batrachomyomachia* (qv), and many of the lost so-called Cyclic Epics, dealing with

the early legends. (See CYCLIC POETS.) To the more thoughtful, however, he was the author of the *Iliad* and the *Odyssey* only. The skeptical "separatists" (chorizontes) denied him the *Odyssey*. To us he is the unknown poet who chiefly shaped the *Iliad* and possibly also the *Odyssey*. His date is placed by Herodotus about 850 B.C., by the moderns, anywhere from 900 to 1100 B.C. At any rate, his is the first name in European literature. The *Iliad*, in 24 books, deals with an episode in the legendary siege of Troy (qv), or Ilion, a real town of which Schliemann (qv) excavated the remains at Hisarlik, a hillock in northwestern Asia Minor. This siege, in one view, is an idealization of the prolonged struggles of Achæan and Æolian invaders from Greece with the old (Phrygian?) possessors of the soil, in another view it represents the struggle between the Greeks and the inhabitants of the Troad for mastery of the Hellespont, and consequent control of trade with the Black Sea. (For this view, consult Leaf, *Troy: A Study in Homeric Geography*, London, 1912.) In the legend the war is undertaken to recover the beautiful Helen (qv), wife of King Menelaus of Sparta, who had eloped with Paris (qv), son of King Priam of Troy. In the tenth year of the war Achilles (qv), the Achæan (Thessalian) hero, quarrels with the Greek commander in chief, Agamemnon, King of Mycenæ, about a captive girl, Briseis, and sulks in his tent, to the great loss of the Greeks, until he is aroused by the death of his dearest friend, Patroclus. Then he hurls himself into the battle and slays the slayer, Hector, the chief bulwark of Troy, with whose solemn burial the poem concludes.

The *Odyssey* relates, likewise in 24 books, the surprising experiences of Odysseus (see ULYSSES) as, after the 10 years' siege of Troy, he wandered for 10 years more, ever yearning to see the rocky isle of Ithaca, his home. (See ITHAKI.) Underplots describe the life of his faithful wife, Penelope, persecuted by the importunate wooing of rude suitors, and the adventures of his son, Telemachus, who in the tenth year goes forth in search of his father. In the end Odysseus returns, joins Telemachus, slays the suitors, and is at last recognized by Penelope. A literature does not thus begin with two long artistic and skillfully constructed epics. (See GREEK LITERATURE, I, *The Age of Epic Poetry*.) We must assume behind the *Iliad* shorter epic ballads such as the bard Phemius in the *Odyssey* (book 1) chants to the suitors, and Demodocus recites at the Phæacian court (*Odyssey*, book viii), hymns to the gods, and songs of the "glory of men," such as Achilles, idle in his tent, sings to the music of a lyre won from the spoils of a captive town (*Iliad*, ix). The systematic mythology of the poems, the number of clearly defined personalities which they present, the profusion of detail about things and persons and places, their literary art, poetical diction, and mastery of the hexameter—all these things presuppose a long historical and literary development. But of this we know nothing except by analogy and inference from the poems themselves. The manifestly spurious ancient "lives" of Homer are clearly in many cases fashioned from minor poems attributed to "Homer." Homer, they tell us, was born of the nymph Critheis and the river Meles (at Smyrna) and hence was called Melesigenes. The name Homer was variously

derived from the Greek word for hostage, because, said the story, he was a hostage in youth, or from a dialectic word for blind, because he lost his sight. Homer, the "lives" continue, wandered from city to city of Asia Minor, earning his bread by reciting his poetry or by "teaching," and immortalized by name in his poems many of those who treated him kindly. Some poems he actually gave to others who won fame by them—to Stasinus of Cyprus, e.g. he gave as his daughter's dowry the *Cypria* (qv), one of the so-called Cyclic Epics, of which only a few fragments remain. He died, as an oracle had foretold, through chagrin at his inability to read the riddle of the fishermen "What we caught we left, what we caught not we bring," which referred not to fishes but to an animal more "familiar to man." After his death,

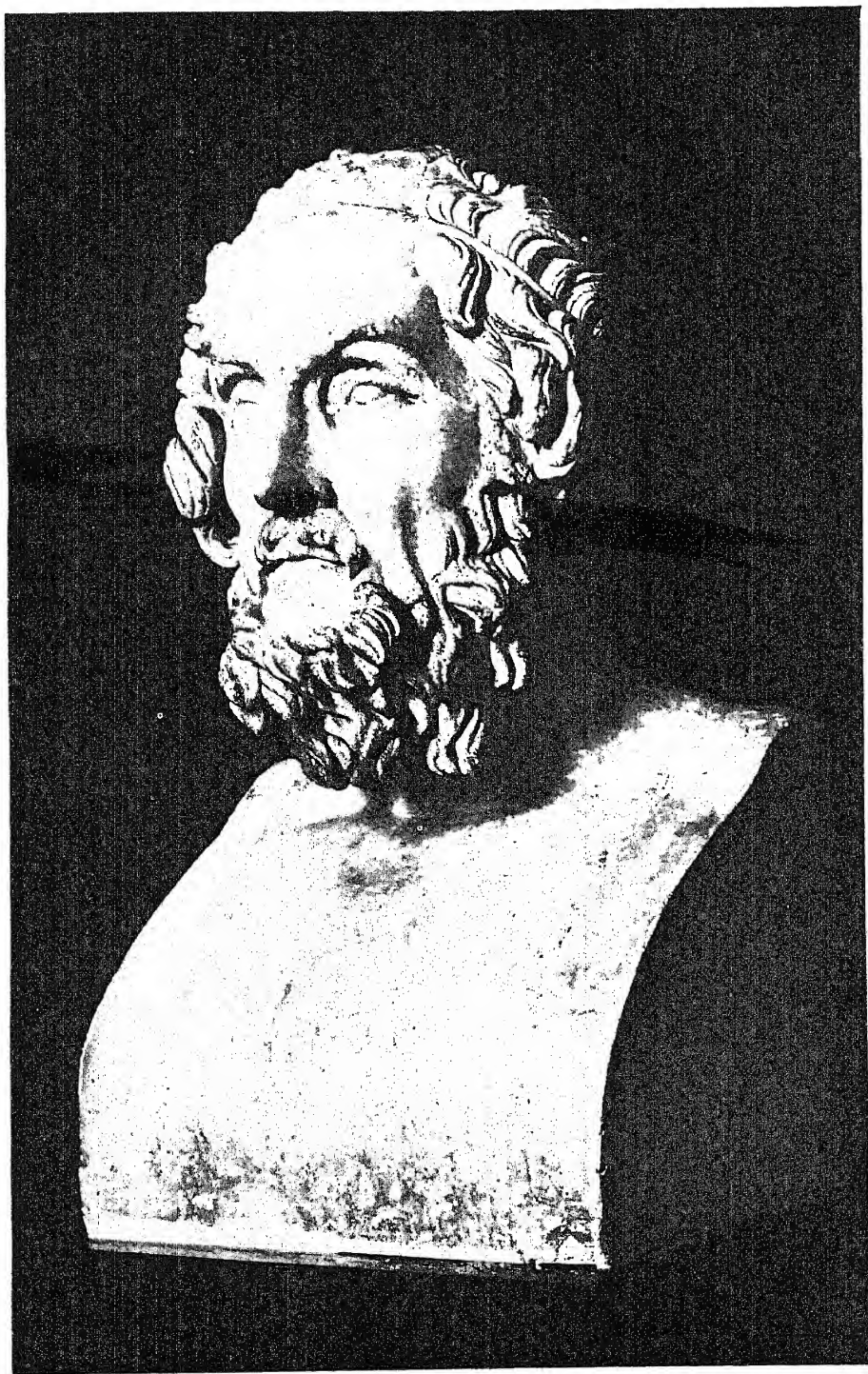
"Seven cities claimed the mighty Homer dead,
Where living Homer begged his daily bread"

All this and much more is fable. Modern scholars ask, rather, What is the origin of epic poetry in Greece? Can we detect in the *Iliad* traces of the ballads or shorter lays out of which we may conceive it to have been composed? Can we break up the *Iliad* into two chief groups of lays—the wrath of Achilles proper, and the general picture of the siege of Troy, by which this original framework was enlarged? What features of style, language, and manners, if any, mark the *Odyssey* as later than the *Iliad*? What parts of the *Iliad* most resemble the *Odyssey* in these features? Can we dissect the *Odyssey* into a "return of Odysseus" and a "Telemachiad"? Was the "story of Achilles" originally composed in Thessaly in the Æolic dialect, then transferred to the scene of the struggles of early Greek colonists in north-western Asia Minor, and finally Ionicized, enlarged, embellished, and chanted by minstrels in the halls of Ionian nobles and merchant princes on the Lydian coast? Does the *Odyssey* reflect the travelers' tales brought back to Ionian seaports by the first navigators of the Euxine and the Mediterranean? What is the precise relation of the life depicted by Homer to the traditional legend of early Greek history on the one hand, and on the other to the apparently similar civilization revealed at Troy, Mycenæ, and Tiryns by the spade of Schliemann (qv), and conjecturally carried back to the third millennium B.C. by recent discoveries in Crete? See ARCHAEOLOGY, II, *Minoan, or Ægean, Period*.

These questions are debated by specialists, but with little unanimity of result. Meanwhile the *Iliad* and the *Odyssey* abide. They may be studied (1) as a picture of early Greek life, (2) as literature; (3) in their historic influence.

Homer is the most objective of poets. In him mind has not yet been turned back upon itself. It is a mirror of the world. If the heroes dine, the ox is consecrated to the gods, slain, cut up, roasted, carved, and served up in our presence. We assist at all the details of the hero's toilet or of his arming for battle. Homer does not enumerate the parts of a ship or a bed, but he shows us Odysseus building the craft that is to bear him away from the isle of Calypso, or the bed whose secret reveals his identity to Penelope. We watch every step in the launching of the vessel that bears Chryseis back to her father. We are not merely told that the ox sacrificed by Nestor has gold-tipped horns;

we see the goldsmith come with the tools of his craft to lay on the gold. In consequence, we know the life of the Homeric man more intimately than that of any other primitive people—than that of the Hebrews or of our own Teutonic ancestors. This lore has been collected in three huge double volumes of Homeric "Realien," or real things, by the German scholar Buchholz (*Die homerische Realien*, 3 vols, Leipzig, 1871-73, 2d ed., 1887), and every history of Greece contains its chapter on early Greek life, religion, government, and manners, drawn from the same source. And this wealth of concrete detail is a striking, if not the chief, literary quality of Homeric poetry. Homer does not "beat in the void his luminous wings in vain." He does not analyze and refine. He is not dominated by any one great unifying religious or patriotic idea, as is Vergil or Dante or Milton. He does not delay to moralize or reflect except in brief pregnant sentences. He flows on and on in a broad, pellucid stream of narrative, description, and, above all, action. "The multitude of things in Homer is wonderful," says Hazlitt—"the splendor, the truth, the power, the variety." The great gods of Homer—Zeus, Apollo, Athena, Hera, Poseidon—have remained for 3000 years as ideal types for all subsequent poetry and sculpture. His personages—Achilles, Hector, Nestor, Odysseus, Helen, Andromache, Penelope, Nausicaa—live for the imagination to-day as no others save those of Shakespeare's greatest tragedies. The berserker battle rage and impassioned eloquence of Achilles still stir the sluggish blood like wine. The great pathetic or dramatic episodes—the parting of Hector and Andromache, the death of Sarpedon, the horses of Achilles mourning for Patroclus, Hecuba baring her bosom to her son from the walls of Troy, the dirges for Hector—are still the despair of imitators. The *Odyssey* is yet the most interesting storybook in the world. In short, the Homeric poems are still, as Matthew Arnold said, "the most important poetical monument existing." The most distinctive literary quality of that poetry is due to its intermediate position between the literary epic, as *Paradise Lost*, and the supposedly spontaneous popular epic, as the *Edda*, the *Kalevala*, or the *Chanson de Roland*. It has all the simple, childlike charm of the one, all the lucidity, architectonic order, and noble diction of the other. The primitive feelings still preserve their freshness and force, but they appeal to us through the medium of a noble and dignified art. But though an artist, and perhaps a conscious artist, the Homeric poet is not, like his successors, Apollonius of Rhodes, Vergil, Tasso, Milton, conscious of an inimitable model, of a long line of predecessors, and of a code of critic-formed rules. Matthew Arnold's four canons of Homeric style are well known. Homer, he says, is rapid, plain, and direct in syntax and words, plain and direct in matter and ideas, and yet withal eminently noble—a master of the grand style in simplicity. There is space only to mention some minor traits: (1) the stereotyped epithets, "cloud-compelling Zeus," the "wine-dark" or "unharvested" sea, the "rosy-fingered dawn," "the swift-footed Achilles," the "red-cheeked ships"; (2) the peculiar Homeric simile which, suggested by one point of resemblance, is continued for the sake of the picture into details where the likeness between the things compared ceases. It is cleverly imitated by Matthew Arnold in



HOMER
FROM AN ANTIQUE BUST IN THE LOUVRE, PARIS

Sohrab and Rustum There are nearly 200 such similes in the *Iliad*, many of them containing precious detail about Homeric life. Those drawn from lions and the chase are particularly vigorous. To the Greek Homer was Bible, Shakespeare, Milton, and Domesday Book in one. Later forms of poetry were looked upon as evolutions or borrowings from Homer. He was the foundation of education, and many cultivated Greeks knew the *Iliad* by heart. Even in the prime of the Attic drama professional rhapsodists recited the *Iliad* and the *Odyssey* to enthusiastic audiences of thousands. Ethical reflection took its first texts from Homer and was largely occupied in the criticism of the conduct and character of his personages. Puerile religious ideas presented themselves in the form of a censure by Plato and Xenophanes of Homeric anthropomorphism, and the allegorical interpretation of literature was invented as a reconciliation. The beginnings of literary and linguistic criticism among the Greek sophists attached themselves to Homeric problems. Lexicography probably originated in books of Homeric glosses. The conception of text criticism arose in the effort to establish a sound Homeric text. And the critical science of the great Alexandrian scholars, Zenodotus, Aristophanes of Byzantium, and Aristarchus, had its origin and achieved its greatest triumphs in the study of Homer.

It is in the modern world that the famous Homeric Question begins (if we ignore slight anticipations by Bentley and Vico), with F. A. Wolf's Latin *Prolegomena ad Homerum*, published in 1795. This was partly called forth by the recent publication of the Venetian scholia, which revealed how much the true text had been debated by the critics of antiquity. Wolf also collected stray notices in ancient authors to the effect that Solon or Hipparchus required the rhapsodists to recite Homer in due succession or from prompting, and that Pisisstratus first reduced the scattered poems of Homer into one body. He inferred that the *Iliad* and the *Odyssey* were not originally composed as we have them, but were put together out of preexisting materials. He confirmed this view by the argument (now refuted by facts) that writing was unknown, or at least rare, in early Greece, and that a long epic could not have been composed without writing. Since Wolf's time Lachmann, Hermann, Nitzsch, Grote, Christ, Leaf, and a host of others have elaborated theories of the composition of the *Iliad*. The debate between the partisans of lays stitched together and an original framework expanded and interpolated often degenerated into a logomachy. The tendency now is towards the second hypothesis. Proof is in the nature of things unattainable. For the present status of the question and bibliographical information concerning studies of the question, reference may be made to Scott, review of Rothe, "Die Ilias als Dichtung," in *The Classical Weekly*, iv (1911), and review of Rothe, "Die Odyssee als Dichtung und ihr Verhältnis zur Ilias," ib., vii (1914), and Shewan, "Recent Homeric Literature," in *Classical Philology*, vii (1912). These two writers, in these and other papers in recent volumes of *Classical Philology*, the *Classical Quarterly*, the *Classical Weekly*, and the *American Journal of Philology*, argue strongly for the unity of the *Iliad* and the *Odyssey* as the work of a single period, even of a single author. On the

other side consult Prentice, a review of Drerup, "Das fünfte Buch der Ilias. Grundlagen einer homerischen Kritik," in *American Journal of Philology*, xxxiv (1913). Meanwhile Chadwick, *The Heroic Age* (Cambridge, 1912), comparing Greek and Teutonic epics and examining the antecedents and environments of the heroic age in Greece about 1000 B.C., and the sources of Teutonic poetry in the third to the sixth centuries A.D., holds that similar conditions produced, with no suspicion of imitation, strikingly similar results. He believes that the Homeric poems reflect the age of the kings as epics based on the court poems of the heroic age itself.

The imitation of Homer through Vergil by Tasso, Camões, and Milton is too large a theme for our space. The critics of the seventeenth and eighteenth centuries elaborated rules for the correct epic which have been entertainingly parodied by Macaulay in his prophetic account of the "Wellingtoniad." Pope's translation (about 1720) long remained a classic and the model of poetical diction. It of course failed to satisfy the taste of the romantic revival at the end of the century or to meet the demands of the new scholarship born about the same time in Germany. Many attempts have been made to supersede it in popular favor, but, despite its artificial rhetoric, it still remains for the majority of English-speaking readers the one poetical translation of Homer. The early versions of Hobbes and Ogilby are of interest only to professional students of literature. Chapman is praised on the faith of Keats's noble sonnet and because of occasional spirited passages and exquisite lines. But the rugged rhythms, the obscurity of the syntax, the fantastic Elizabethan conceits, and the long uninspired tracts of doggerel make him intolerable in continuous perusal. Cowper, in his blank-verse version, aimed at uniting Miltonic stateliness with fidelity to Homeric simplicity, but succeeded only in being pompous and dull. Since the publication of Matthew Arnold's classic lectures *On Translating Homer*, we have had, among others, the estimable blank-verse translations of Lord Derby and of Bryant, and Way's spirited rendering in rhymed anapaestic hexameter. No definitive translation of Homer is possible, for every generation must reinterpret him in order to blend Homeric sentiment with its own in the measure demanded by its taste. Of late the majority of readers prefer the literal prose versions in the slightly archaic and consciously simple English of Lang, Leaf, and Myers (*Iliad*), and Butcher and Lang (*Odyssey*).

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Good text editions are those of Dindorf-

Hentze, Cauer, Van Leeuwen, Monro, and Allen. A good annotated (English) edition of the *Iliad* is that of Leaf (2 vols, 2d ed, London, 1900-02), and of the *Odyssey* that of Hayman (ib, 1882) and that of Merry Riddell and Monro (2 vols, Oxford, 1886-1901). An excellent annotated edition in German is that by Ameis-Hentze (Leipzig, undergoing revision again in 1914). The fullest Homeric lexicon is the *Lexicon Homericum* of Ebeling (Leipzig, 1885), or in English the Homeric Dictionary, by Autenrieth-Keep (New York, 1891). For the general study of Homeric antiquities, consult Buchholz, *Homische Realien* (3 vols, 2d ed, Leipzig, 1887). Helbig, *Das homerische Epos aus den Denkmälern erläutert* (2d ed, ib, 1887). Andersen-Engelmann, *Pictorial Atlas to Homer* (New York, 1892). Reichel, *Ueber homerische Waffen* (Vienna, 1894). Keller, *Homeric Societiy* (London, 1902). Bériard, *Les Phéniciens et l'Odysée* (Paris, 1902-03). Browne, *Handbook of Homeric Study* (London, 1905). Seymour, *Life in the Homeric Age* (New York, 1907). Robert, "Topographische Probleme der Ilias," in *Hermes*, xlii (1907). See EPIC POETRY. GREEK LITERATURE, and the articles on the various authors and scholars, ancient and modern, mentioned in the article above.

HOMER, APOTHEOSIS OF 1 A celebrated relief containing many figures, now in the British Museum. It was found in the Appian Way in the seventeenth century and probably dates from the first century A.D. 2 A large picture by Ingres (q.v.), now in the Louvre.

HOMER, LOUISE (c 1872-). An American dramatic contralto, born in Pittsburgh, Pa. Her maiden name was Louise Dilworth Beatty. She began her musical studies in Philadelphia. In 1894 she was studying singing with Wm. L. Whitney in Boston, and harmony with Sidney Homer, whom she married the following year. After two more years of study with Madame Koenig at Paris she made her début at Vichy as Leonora in *La Favorita* (1898). In the spring of 1899 she appeared at Covent Garden and in the fall at La Monnaie in Brussels. Her success at the Metropolitan Opera House of New York during her first season in 1900 was so emphatic and lasting that she continued thereafter to be a regular member of the company. With a voice of great compass, remarkably even in the different registers, she combines a fiery temperament and more than ordinary histrionic ability.

HOMER, SIDNEY (1864-). An American composer, born in Boston. He received his first musical instruction from G. W. Chadwick in Boston. Then he spent five years studying in Europe, three years being devoted to the study of composition under Rheinberger at the Königl. Musikschule in Munich. From 1888 to 1896 he lived in Boston as a private teacher of harmony and counterpoint. There Louise Beatty (subsequently famous as Louise Homer, q.v.) became his pupil and in 1895 his wife. He also gave lecture recitals on symphonies and the music dramas of Wagner. As a composer, he is known only for his songs, although he wrote some works in the larger forms, he did not publish them.

HOMER, WINSLOW (1836-1910). An American genre and marine painter, one of the foremost and the most typical of his school. He was born at Boston, Feb. 24, 1836, but passed his boyhood at Cambridge, Mass., then a small town, where his passion for outdoor life had

full scope. At 19 he entered a lithographer's shop and after two years set up for himself in Boston, designing illustrations for *Ballou's Monthly* and for Harper and Brothers, who offered him a salaried position, which was declined. In 1859 he removed to New York, and, while supporting himself by illustrating, he attended the night class of the National Academy of Design under Cummings. From Frederic Rondel, a French painter usually reputed his master, he had just four lessons. On the outbreak of the Civil War, in 1861, he went to the front as a special war correspondent and artist for *Harper's Weekly*. His election as associate (1864) and member (1865) of the National Academy came during the period of his earliest oil paintings of war and camp subjects, such as "Rations" (1863), "The Bright Side" (1865), and, most celebrated of all, "Prisoners from the Front" (1865). In 1867 he made his first trip to Europe, exhibiting the two last-named pictures with much success at Paris, Brussels, and Antwerp. Ten months spent in Paris were without influence upon his art, and on his return to New York he continued to illustrate for the Harpers until 1875. He painted a number of genre subjects, chiefly of New England village life and of negro life and character, studied during a sojourn at Petersburg, Va. These two groups include "New England Country School", "Snapping the Whip", "The Two Guides," an Adirondack subject, "A Visit from the Old Mistress" (1876), now in the National Gallery, Washington, "The Camp-fire."

His interest, however, turned more to subjects relating to the sea. In 1880 he painted at Gloucester, Mass., and in 1881-82 at Tyne-mouth on the east coast of England, depicting the life of the fisher folk in a series of remarkable aquarelles and several oil paintings, such as "Mending the Nets," "Watching the Tempest," and "A Voice from the Cliffs." In 1884 he settled permanently at Prout's Neck, near Scarborough, Me., entering upon his great career as the painter of the ocean and the fisher folk. His incomparable series of paintings began with "The Life Line" (1884), Elkins collection, Philadelphia. This was followed by "The Fog Warning" (1885), Boston Art Museum, "Lost on the Grand Banks" (1886), "Undertow" (1886), "Eight Bells," "The West Wind," "A Summer Night," Luxembourg Museum, Paris, the "Northeaster" and "Cannon Rock," both (1895) in the Metropolitan Museum, New York, "The Fox Hunt," Pennsylvania Academy, Philadelphia, "High Cliff, Coast of Maine" (1894), National Gallery, Washington, "Lookout—All's Well," Boston Art Museum, "The Maine Coast" (1895), Metropolitan Museum; and "On a Lee Shore" (1900), Providence—the two last often considered his masterpieces. His solitary life in Maine was enlivened by constant association with his brothers, varied by winter journeys to Florida, the Bahamas, and Cuba, resulting in a brilliant series of water colors, some of which are in the Brooklyn Museum, by trips to the Adirondacks and the Province of Quebec, the waters and fishes of which he has studied in marvelous manner. His numerous aquarelles are scattered throughout public museums (New York, Boston, Brooklyn, Worcester, etc.) and private collections. He received gold medals at the World's Fair, Chicago (1892), at Pittsburgh (1896), Philadelphia, and the Paris Exposition (1900), and was

a member of the American Academy of Arts and Letters

Winslow Homer is the most typically national of all American painters. Self-taught in his technique, marked by the complete absence of foreign influence, he is no less national in his subjects and his powerful and direct presentation. The chief characteristic of his art is its absolute verity, its uncompromising presentation of nature. His color is strong and sure, sometimes harsh, but always true, especially in the values. But his pictures lack tone (except in so far as nature provides it), and therefore lack the decorative quality. Both draftsmanship and composition are excellent. In water color his technique is a marvel of boldness and facility.

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HOMERIDES, hō-mēr'i-dēz, or **HOMERIDÆ** (Lat., from Gk. Ὅμηριδης, *Homēridēs*, descendant of Homer, from Ὅμηρος, *Homēros*, Homer). The name of a family or clan in the island of Chios, often mentioned. Strabo says that they claimed descent from Homer, and that they were adduced by the Chians to prove that Homer himself was a Chian. The name *Homēridēs*, however, is used by Pindar and by others frequently to mean persons who recite the Homeric poems, i.e., rhapsodists (qv), and it is in this sense that the name is commonly used. The *Homēridēs* of Chios have played a large part in the theories of some scholars as to the transmission of the Homeric poems, but there is no evidence that they were a guild of poets or even of rhapsodists. Consult Christ-Schmid, *Geschichte der griechischen Literatur*, vol. 1, pp. 35, 70 (5th ed., Munich, 1908).

HOMEROCENTONES, hō-mēr'ō-sēn-tō'nēz. See EUDOCIA, CENTONES HOMERICI.

HOMER PIGEON. See PIGEON.

HOME RULE. A term in British politics, designating the particular movement, begun in 1870, to secure for Ireland a local legislature and thus recognize and satisfy the persistent sentiment of Irish nationality. The question of Home Rule, ignored by Pitt in the Act of Union of 1800, was revived by O'Connell's agitation for repeal. With the failure in 1848 of that movement, hostility to British rule passed from the field of constitutional exertion to that of violence and revolution. But neither the doctrinaire fiasco of 1848 nor the plots of the Fenians brought any realization of the national aspirations. After 20 troubled years of conspiracy and secret crime the concession by Gladstone of Church disestablishment and land reform called the thoughts and hopes of the Irish people once more to constitutional activity. In 1870, a year after the Act of Disestablishment was passed, and while Gladstone's first Land Bill was still under discussion in Parliament, the first step was taken in the movement for Home Rule.

On May 19 in that year there assembled at the Bilton Hotel, Dublin, a number of Irishmen of the better class, representing all shades of political and religious belief. The dominant element was Protestant and Conservative. Discontented with the concessions made by Glad-

stone's government, they were ready to consider some plan for taking out of British hands the control of Irish affairs. After free discussion it was resolved "that the true remedy for the evils of Ireland is the establishment of an Irish Parliament, with full control over our domestic affairs." In accordance with this opinion a permanent organization was soon afterward effected, under the name of 'The Home Government Association of Ireland.' Its declaration of principles announced as its only object the obtaining of a distinct Parliament for Ireland, to regulate her internal affairs, while leaving to the Imperial Parliament all questions affecting the colonies, foreign relations, and the stability and defense of the Empire. With this declaration the movement for Home Rule was formally inaugurated.

The history of the Home Rule movement from 1870 to the present time may be divided into five periods: first the leadership of Isaac Butt (1870-79), second, the merging of Home Rule into the land agitation (1879-86), third, the adoption of the principles by the Gladstonian Liberals (1886-93), fourth, the Conservative policy of "killing Home Rule by kindness", fifth, the passage of the Government of Ireland Bill by the Asquith ministry in 1914.

First Period This was the time of development and definition. From the outset the Home Rule idea was favorably received among the better classes of the Irish people, though ancient religious antipathies often blocked the way. Among the lower classes—those particularly in which Fenianism had found its chief support—the new form of constitutional agitation was slow to inspire confidence. Under the direction of Isaac Butt, however, who had made himself popular by his legal services in behalf of arrested Fenians, considerable progress was made, and at by-elections several Home Rulers, including Butt himself, were elected to Parliament. In the fall of 1873 the Home Government Association was replaced by the Irish Home Rule League, a new and more comprehensive organization, whose skillful management secured the return of 60 Home Rulers in the general election of 1874. For the next five years, under the leadership of Isaac Butt, they acted as a distinct party when Home Rule or Irish interests were at stake, but on other questions followed their individual preferences. In fact, during this period, outside of Ireland, there was very little interest in the subject, and English Liberal and English Conservative alike had voted against Butt's annual motion for an Irish Parliament. But an awakening was to come, when Parnell, who entered the Commons in 1875, began to advocate his policy of "obstruction," applying it—aided by a little group of followers—to all questions alike, whether Irish, English, or Imperial. In this course he was opposed by Butt and the majority of the party at that time, but through this policy Parnell succeeded in arousing the English people to a discussion of the subject and in winning, partly perhaps by means of the hatred he excited towards himself on the part of the old British parties, the enthusiastic support of Irishmen to a degree which Butt's milder course had never done.

Second Period Butt died in the spring of 1879. The Home Rule party chose as his successor William Shaw, whose methods it was known would be those of Butt. But Parnell

was the rising man in Irish circles. In this same year, by throwing himself heart and soul into the land agitation and assuming the presidency of the Land League, he became the idol of the Irish masses. During the four succeeding years Home Rule was entirely overshadowed by the great agrarian issue. The general elections of 1880 showed an increase of the Home Rule delegation in Parliament from 60 to 68. But the extreme views of Parnell and his followers on the land question tended to alienate the moderate element in the party, already disgusted with his parliamentary tactics. During the desperate struggle made by the Parnellites against the Coercion Bill in January, 1881, Shaw and his followers formally withdrew from the Home Rule party in Parliament. This action was significant of a great change in the character of the party outside of Parliament. By connecting Home Rule with the land question Parnell drew to his support a great following, which Butt had never won, but he lost the Conservative and aristocratic element, which had practically inaugurated the movement. A Catholic peasantry instead of a Protestant middle class became the chief support of the party. With this absorption of the larger element one end was achieved which has been a source of about equal glory and reproach to Parnell—the physical-force faction, hitherto apathetic, was drawn into the constitutional agitation. The Irish National League, organized Oct. 17, 1882, was the formal expression of the Parnellite policy. Its programme combined essentially the principles of the Home Rule League and those of the recently suppressed Land League. In the elections of 1885 the success of Parnellism was demonstrated. The Nationalists returned 86 members to the House of Commons and secured the balance of power between the Liberals (333) and the Conservatives (251). Of the 103 members from Ireland, 85 were followers of Parnell.

Third Period. With an absolute Liberal majority in Parliament, so skillful a leader as Gladstone had found it almost impossible to transact business in the face of Nationalist obstruction. Now that Parnell held the balance of power and could displace ministries at will, the conduct of the government on any principle known to British practice seemed hopeless. On Jan. 27, 1886, the Nationalists aided the Liberals to overthrow Lord Salisbury's government, just as in the preceding year they had joined the Conservatives against Mr Gladstone. The Conservatives now made advances looking to an understanding between the Nationalists and themselves, but without results. On the other hand, Gladstone, after careful consideration and consultation, decided to accept Home Rule as a Liberal principle, so on the 8th of April he brought in his famous Home Rule Bill. In it was embodied the long-sought provision for a distinct legislative body for Ireland, with powers extending to all subjects except those specifically reserved to the Parliament at Westminster. At the same time a sweeping measure for land purchase was announced, with the declaration that the two should be inseparable, together forming a complete scheme for the settlement of the Irish question. Parnell, with certain qualifications, accepted the bill on the part of the Irish Nationalists, and his party threw themselves heartily into alliance with the followers of Gladstone. The question of Home Rule now

became one for the people of Great Britain to settle. With the adoption of the Irish demand by Gladstone, a great section of the Liberals declined to follow their old leader. Protesting against anything which looked like a step towards separation of the two islands, they took the name of Liberal Unionists and ultimately entered into alliance with the Conservatives. Gladstone's bill was defeated on the second reading by 343 to 313, 93 Liberals voting in the negative. Upon the appeal to the constituencies the adversaries of Home Rule gained a majority of 113 over the combined Gladstonians and Nationalists. Lord Salisbury assumed power with a policy of coercion, with possibly some eventual measure of concession in reference to local government in Ireland. Home Rule remained the most prominent issue throughout the four succeeding years, the Gladstonians expressing confidence in the ultimate support of a British majority, a belief which the by-elections seemed to justify, as the Liberals gained 16 seats in 99 contests. In the winter of 1890-91 a divorce case in which Parnell was correspondent brought much odium upon him and raised the question of his retirement from the leadership of his party. Gladstone announced that he could not hope to hold the Liberals to the Nationalist alliance unless Parnell resigned. The latter rejected all suggestions of his own withdrawal and by his course alienated a large section of his parliamentary followers. The result was a schism in the Irish Nationalist party, which made the future success of the Home Rule movement exceedingly doubtful. The death of Parnell, in October, 1891, only served for the moment to intensify the animosity of the Parnellite faction towards the majority of the Home Rulers, who accepted the leadership of Justin McCarthy (qv). The elections of July, 1892, resulted in a Liberal majority in the House of Commons of 40, so that Gladstone again became Premier, and in March, 1893, introduced a bill granting Home Rule to Ireland. It provided for an Irish legislative body of two houses, the members of the Upper House to be chosen by electors having a property qualification, and for complete self-government in local matters. The difficult question of Ireland's representation in the Imperial Parliament was first decided in favor of the "in-and-out" plan—Irish members voting on some questions, not on others—but later in favor of a reduction of its membership in the House of Commons from 103 to 80, with the same rights as other members. The bill passed the Commons September 1 (301 to 267), but was overwhelmingly defeated in the Lords, receiving only 41 votes out of a total of 450. Gladstone resigned in March, 1894, and Lord Rosebery assumed the premiership, professing adherence to Home Rule, but doing nothing for it during his ministry, which came to an end in June, 1895.

Fourth Period. This period opened with the Conservatives in power, the Home Rulers split into cliques and factions, and the Liberals demoralized and lukewarm towards the cause of the Irish Nationalists. The Conservatives, believing that Irish discontent had its source in economic conditions, in poverty and want, passed, under the cry of "killing Home Rule by kindness," a land act which simplified the rent problem, provided for land purchase, tended to bring a peasant proprietor class into being, and in general ameliorated economic conditions. In

1898 a Local Government Bill was introduced, and became a law in 1899, which placed county and municipal governments in the hands of the people, with provisions for an almost universal suffrage. Owing in part to improved conditions, in part to these reforms, public agitation had almost ceased, and it seemed as if "Balfourian amelioration" was on the point of success, when the Boer War broke out. Under the impulse of this war the warring Irish factions came together, accepted John E. Redmond as a common leader, revived their demand for an Irish Parliament, and in the election of 1900 chose 81 members to the House of Commons to press their cause. The benevolent attitude of the Unionist ministry was further exemplified in the important Land Act of 1903. (See IRISH LAND LAWS.) In 1904-05 much discussion in Parliament was aroused by a scheme for the gradual establishment of self-government propounded by the Irish Reform Association under the name of Devolution. It was assailed by the Protestant minority as being equivalent to Home Rule. The accession of a Liberal ministry under Sir Henry Campbell-Bannerman, December, 1905, was regarded as distinctly favorable to the Irish cause, inasmuch as the Premier and a number of leading members of the cabinet were avowed supporters of Home Rule. It was understood, however, that the government would not permit a sudden disruption of the union, though acquiescing in a policy of "Home Rule by installments." The Liberal-Unionist party attempted to make Home Rule an issue in the general election of 1906, but without success. In that election the Nationalists returned 83 members to Parliament.

Fifth Period. The defeat of the Unionists in the general elections of 1906 marks the beginning of a new era of Liberal government and reform. The following year Mr. Birrell's proposed Irish Councils Bill, giving considerable latitude to the Home Rulers, was denounced and rejected at a national convention in Dublin and was therefore withdrawn. The general elections of 1910 placed the Liberal and Unionist parties in positions of almost exact equality in the House of Commons, while the Nationalists held the balance of power and controlled the fortunes of Mr. Asquith's government. Conscious of power and supported by the Labor party in the House of Commons, the Irish members insisted that Home Rule be given precedence over all other measures. While speculation was rife as to the government's Home Rule plans, agitators in Ulster were not idle, for the Unionists of that province, led by Sir Edward Carson, appointed a committee to draw up a provisional government for Ulster, which should come into operation if the Home Rule measure was passed.

On April 11, 1912, Mr. Asquith introduced the Government of Ireland Bill. While asserting the supreme authority of the Imperial Parliament, it provides for a bicameral Irish Parliament—the Senate of 40 members nominated in the first instance by Great Britain and succeeded, as their terms expire, by appointees of the Irish Executive, and the House of Commons, 164 in number, to be elected by the Irish constituencies. The executive authority is vested in the King, represented by the Lord Lieutenant and an Irish ministry named by Parliament. The Irish Parliament is empowered to make all laws for Ireland, but cer-

tain classes of legislation are removed from its jurisdiction, such as peace, war, treaties, army, navy, militia, trade navigation, coast defenses, coinage, stamps, weights, measures, copyright, religion, and Freemasonry. The Irish constabulary are to remain under Imperial control for six years after the passage of the act. The following services would likewise be excluded for the present, the land-purchase tax, old-age pensions, national insurance, postal savings banks, and the service of public loans before the passage of the act. In the Imperial Parliament Ireland is to have 42 members, which number, in view of the divided authority, fiscal, legislative, and executive, set up by the bill, might be sufficient to guard her own reserved interests. While in the committee stage, the bill was so amended as to permit the principle of proportional representation—all constituencies electing three or more members to the Irish House of Commons and the entire Irish Senate after five years to be chosen by this method. The bill passed its third reading in the House of Commons on Jan. 16, 1913. On January 30 it was rejected by the Lords by a vote of 326 to 69. Following the rejection of Sir Edward Carson's amendment, excluding Ulster from the provisions of the Home Rule Bill, the Ulster Volunteers proceeded to add to their numbers and equipment, aided by Unionists from Great Britain. Realizing that Home Rule must come, the Belfast Trade Unions and other representative bodies protest that they are not in favor of exclusion. They maintain that the real source of hostility to Home Rule is not fear of religious persecution but the financial arrangements of the proposed law. The financial margin allowed is too small to enable the Irish Parliament to effect the many reforms required without taxing heavily either the land or commercial business, and as agriculture will be in control, they believe the onus will fall on the commercial interests of Ulster. The industrial workers of Belfast likewise fear they will be at the mercy of a parliament which will have no interest at all in maintaining a high level of labor conditions, for the Irish Parliament will be dominated, not by representatives of the agricultural laborers, but of the tenant farmers, who, so far as they are interested in employment at all, are interested as employers and pay the lowest wages in the United Kingdom.

The bill, reintroduced in the summer session, passed its third reading in the Commons on July 17. Upon the reopening of Parliament on Feb. 10, 1914, the government announced its intention of passing the Government of Ireland Bill, for the third time, during the session without submitting it to the test of a referendum or a general election, as the Unionists demanded. Premier Asquith, on March 9, proposed that those counties of Ulster which should by a referendum so determine be excluded from the provisions of the act for six years. The resignation of Colonel Seeley, Undersecretary of State for War, after the remarkable disaffection of the higher officers of the British forces in Ireland, led to the assumption of the war portfolio by Mr. Asquith himself, and the official recognition by the Irish party of the National Volunteers, a semimilitary organization of Irish Catholics. The bill passed the House of Commons for the third and last time on May 25. It was then sent to the Lords, who refused to

act until the amending measure was before them. Radically modified, it passed its third reading in the Upper House on July 15. Five days later the Commons took up the measure as amended for extended consideration. The King, in his efforts towards an amicable adjustment, called a conference of the leaders of all parties. As the extremists refused to make any concessions in the interests of peace, the conference ended in failure. On the following Sunday a force of the Kings Own Scottish Borderers, sent from Dublin to disarm some National Volunteers at Howth, were stoned by a mob on their return. The troops fired a volley of ball cartridges, killing four people and wounding from 30 to 50. Anger and indignation in England and Ireland were so intense that Mr Asquith postponed all consideration of the Home Rule Bill until the excitement and passion had abated. Just as the Irish situation was becoming serious, the great European War of 1914 broke out. The Irish question immediately vanished from public view. In the face of danger both sides patriotically united to defend the Empire. John E. Redmond, the leader of the Irish party, declared in Parliament that every British soldier could now be removed from Ireland without danger to public order.

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HOMESICKNESS See NOSTALGIA

HOMESTEAD (home, AS. *hām*, Goth. *hams*, OHG *heim*, Ger. *Heim*, connected with Lith *kemas*, Gk *κῆμα*, *kōmē*, village, Skt *ksēma*, abode, from *ks*, to dwell + *stead*, AS. *stede*, Goth. *staps*, OHG *stat*, Ger. *Statt*, place, ultimately connected with Eng. *stand*). In law, an estate in land, used as a home by the tenant or owner thereof, and to a greater or less extent protected by law from the claims of creditors. This right of exemption of the "homesteader," as he is termed, is a modern privilege created by statute and was unknown to the common law. It does not exist in England, but is peculiar to the United States, where it is everywhere recognized, excepting in Rhode Island, Pennsylvania, Delaware, Maryland, and the District of Columbia. It does not constitute a distinct form of estate in land, but belongs to

the class of exemptions from the claims of creditors, which, originating in the common law, has been greatly extended by the humane policy of American law. See EXEMPTION, HOMESTEAD LAWS.

HOMESTEAD. A borough in Allegheny Co., Pa., on the Monongahela River 7 miles southeast of Pittsburgh, on the Pittsburgh and Lake Erie, the Bessemer and Lake Erie, the Pennsylvania, and the Union railroads (Map Pennsylvania, B 6). It has one of the largest steel plants in the United States, employing about 7000 men and producing both structural steel and nickel-steel armor plate, and a machine factory. There is a Carnegie library. Settled in 1871, Homestead was incorporated in 1880, the date of the charter now in operation, which provides for a mayor, elected every three years, and a unicameral council, in whose power rests the appointment of chief of police, street commissioner, and water-works engineer. The water works are owned and operated by the borough. In 1892 Homestead was the scene of a notable strike, which was attended by such rioting as necessitated the interference of State troops. Pop., 1900, 12,554, 1910, 18,713, 1914 (U. S. est.), 21,256.

HOMESTEAD LAWS. Homestead laws in the United States are of two classes—those enacted by Congress and those enacted by State legislatures. The primary object of the first class is to enable citizens without capital to acquire homes. The main object of the second class is to secure homes, once acquired, against the claims of creditors. Legislation of the first class has done much to stimulate the settlement and improvement of wild, unoccupied land. That of the second class has saved countless families from pauperism.

The Federal homestead laws began with the Act of 1862, now a part of the United States Revised Statutes (§§ 2289-2317). Their policy is to give portions of the public lands to those who will settle, cultivate, and make permanent homes upon them. Any person who is the head of a family, or who is 21 years of age and is a citizen of the United States, or who has filed his declaration of intention to become such, may acquire a tract of unappropriated public land, not exceeding 160 acres, on condition of settlement, cultivation, and continuous occupancy as a home by him for the period of five years, and of the payment of certain moderate fees. It is expressly declared that no lands acquired under this statute shall in any event become liable to the satisfaction of any debt contracted prior to the issuing of the patent therefor by the government to the settler. This provision was inserted for the purpose of protecting debtors and of inducing them to settle upon the public domain. Its constitutionality was questioned, but was sustained by the courts. It would be difficult to point to any enactment of Congress more wise in conception, more just in policy, and more beneficial in its results than this homestead statute and its amendments. Under their provisions more than 85,000,000 acres of unoccupied public lands have been transferred by the United States to homestead settlers.

The term "original entry" refers to the proceeding by which a person enters a tract of land as his homestead. Its important features are the filing of an affidavit, prescribed by statute, with the register of the land office in which the applicant is about to make the entry, and the

payment of a fee of five dollars if his entry is for not more than 80 acres, or of 10 dollars if it is for more than that quantity. The "final entry" refers to the proceedings connected with the issue of a certificate of title or patent by the United States to the person making the original entry, or to his widow, heirs, or devisees. Ordinarily the patent does not issue until the expiration of five years from the date of the original entry, and then only upon furnishing the evidence required by statute of the actual occupancy of the land and its cultivation by the claimant during that period. Provision is made, however, for shortening this term by "commuting," i.e., paying the minimum government price for the land. Upon such payment the homesteader may obtain a patent at any time. It is also provided that the term which a homestead settler served in the United States army, navy, or marine corps, "during the Rebellion," or in "the Spanish War," or "in suppressing the insurrection in the Philippines," may be deducted from the five years required to perfect his title and to receive a patent for his original entry.

State homestead laws are, as has been said above, in their objects and tenor quite different from those of the Federal government. Their aim, it has been judicially declared, "is to provide a place for the family and its surviving members, where they may reside and enjoy the comforts of a home, freed from any anxiety that it may be taken from them against their will, either by reason of their own necessity or improvidence or from the importunity of their creditors." This policy of protecting citizens and their families from the miseries and demoralizing influences of destitution, of fostering the disposition to improve and to take pride in a permanent homestead, has commended itself to both legislators and judges. The former have enacted laws providing for large exemptions to the homesteader, while the latter have, with few exceptions, construed such laws very liberally in his favor. In most of the States the benefits of this legislation are confined to families, although in a few Commonwealths they are extended to any resident, whether he has a family dependent upon him or not.

State legislation provides three distinct ways in which a homestead may be secured to the family against the debts of its owner. The first method is by a prescribed form of public notice properly executed and recorded. It must contain a statement of the facts showing that the person making it is the head of a family, a statement that such person resides on the land and claims it as a homestead, a description of the land, and an estimate of its actual cash value. The second method is by actual occupancy and use. The third method is by a proceeding in a court of justice. Its principal characteristics are an application to a designated court, a notice to creditors, and a judicial decree setting apart certain property as a homestead.

It is not to be understood that homestead property is exempted from every sort of claim against its owner. As a rule, it is subject to debts contracted before the homestead was duly recorded or set apart as such, to the liens of mortgages and judgments which were on the property when it was set apart, to claims for unpaid purchase money for the property, as well as for such improvements to the property

as entitle the creditor to a mechanic's lien (*q v*) thereon, and to taxes and assessments for public improvements.

The amount of land which may be exempted under homestead laws varies in the different States. In some the limits are those of acreage, in others those of cash value. The former range ordinarily from 40 to 160 acres, the latter from \$500 to \$5000. Consult Thompson, *Homesteads and Exemptions* (San Francisco, 1886), and Waples, *Treatise on Homesteads and Exemptions* (Chicago, 1893).

HOME, SWEET HOME. A popular song by John Howard Payne, in his opera, *Clari, or the Maid of Milan*, first produced in 1823. The music of the song is by the composer of the opera, Sir Henry Bishop, who is said to have adapted it from an old Sicilian air.

HOMEWARD BOUND. A novel by J. Fenimore Cooper (1838).

HOMICIDAL (*hōm'i-sīd'al*) **MANIA.** A popular term for the impulse to take life in one mentally disordered. In manic-depressive insanity, in general paresis, in paranoia, and other insane conditions, the homicidal impulse is not infrequent. Indeed, in normal mental action the desire to kill is not infrequently present, but is controlled. In the various stages of some insanities this control is either diminished, or through hallucinations or delusions the motive is stronger and uncontrollable, and murder results. It is impossible to determine beforehand whether an insane person will or will not take another's life. Often such an act is apparently the first symptom of the insanity. The obvious lesson is that the slightest symptoms of disturbed mental action should be carefully noted and proper precautions taken to prevent accidents. This caution is particularly pertinent in the case of puerperal women in whose family there has been any taint of insanity.

HOMICIDE, *hōm'i-sīd* (OF., Fr *homicide*, from Lat *homicidium*, manslaughter, from *homo*, man + *cedere*, to kill). The killing of one human being by the act, procurement, or neglect of another. In primitive communities the killing of another does not subject the slayer to criminal prosecution by the state. The act is thought of, not as an offense against the common weal, but simply as a wrong to the slain man's kindred—a wrong which they are at liberty to redress by vengeance upon the slayer or his kindred. But this policy leads to the perpetuation of blood feuds and to great waste of human life. Accordingly, at a very early time, the practice is introduced of buying off the injured kindred, or appeasing the feud by a money payment. Then a scale of compensation is fixed either by custom or by legislation, graduated generally by the rank of the person slain. In Anglo-Saxon law this is known as *wergild* (a man's price). At first the acceptance of such compensation is left to the choice of the injured kindred. They may take it and stay the feud, or they may reject it and enforce their right of private vengeance. But as the state grows more powerful, and the death of its citizens is felt to be a harm to the common weal, public authority compels the injured kindred to accept the compensation and not to pursue the feud. Then comes the final stage of legal development, in which the unlawful taking of human life is considered as primarily a wrong to the state, a public offense which cannot be

compounded by private bargain See AVENGER OF BLOOD, BLOOD FEUD, BLOOD MONEY, ASYLUM, WERGILD, ETC

As appears from the definition given above, homicide is a generic term, comprehending not only the crimes of murder and manslaughter (qq v), but also the taking of a human life under circumstances justifying the act or in a sense excusing its commission Killing under such circumstances, not amounting to murder or manslaughter, is described as justifiable or excusable homicide While the distinction between these has in law been wholly done away with, the early common law made an important distinction between excusable and justifiable homicide The slayer in the latter case was not liable to any punishment, while in the former he was In other words, homicide, if not committed under circumstances justifying the act, was, however excusable on moral grounds, still a criminal offense Just how far it subjected the slayer to criminal punishment is, however, uncertain Lord Coke declares that it rendered him liable to death, but Blackstone and Stephen insist that his liability did not extend beyond the forfeiture of goods At present neither excusable homicide nor justifiable homicide is punishable at all, but the two terms are still retained in use in England and in many of the United States as marking a convenient distinction between two distinct classes of innocent, or noncriminal, killing At common law excusable homicide was of two kinds—killing by accident or misfortune, and killing in self-defense Justifiable homicide was of three kinds—killing by a public officer in conformity to a judicial sentence, killing by an officer or his assistant when necessary to overcome unlawful resistance to legal process, or to the performance of a legal duty, including killing by military forces in time of war or riot, and killing to prevent the commission of an atrocious crime of violence While the common-law definition of these forms of homicide has been more or less modified by statute, it remains substantially the same, both in England and the United States

Even unintentional homicide is not excusable unless it is committed without legal fault on the part of the slayer The killing may not have been premeditated or intended—it may have been accidental—yet if it resulted from the slayer's unlawful conduct, as in connection with the commission of burglary or robbery, it is not a case of excusable homicide, but of manslaughter or murder, as the case may be So, too, homicide is justifiable only when it is inflicted in strict accordance with lawful authority A sheriff who inflicts the death penalty upon a convict in a manner not authorized by the judicial sentence which he undertakes to execute does a criminal, not a justifiable, act An officer cannot justify the unnecessary killing of even the worst malefactor that is resisting arrest Nor is a person at liberty to take the life of a brutal assailant unless he can show that he had reasonable ground to believe that the assailant was about to commit a felony or do some great personal injury to the slayer or to some member of his family or other person in his presence, and that there was imminent danger of the assailant's accomplishing his design.

Consult. Stephen, *History of the Criminal Law of England* (London, 1883), Clark and Marshall, *Law of Crimes* (2d ed., St. Paul,

1905). F Wharton, *Laws of Homicide* (3d ed., Chicago, 1907), and the authorities referred to under CRIMINAL LAW

HOMILDON, hōm'īl-don, or **HUMLEDON** (hūm'b'l-don) **HILL** An elevation near Wooler, in Northumberland, England, not far from the Scottish border, noted as the scene of a battle in which the English, under the Earl of Northumberland and his son, Harry Hotspur, overthrew a Scottish army under the command of Sir Murdoch Stewart and the Earl of Douglas, Sept 14, 1402 The victory at Homildon Hill was soon followed by the rebellion of the Earl of Northumberland and his son See HENRY IV

HOMILETICS (from Gk *ὁμιλητικός*, *homilētikos*, relating to conversation, from *ὁμιλία*, *homilia*, conversation, from *ὁμιλεῖν*, *homilein*, to converse, from *ὁμιλος*, *homilos*, assembly, from *ὁμός*, *homos*, similar + *ἵλη*, *ilē*, *εἶλη*, *eilē*, company, from *εἰλεῖν*, *eilēin*, to crowd together) As the term is now used, the science of sermon writing In early Christian times discourses were less formal than they became later (see HOMILY) and so were properly called homilies The earliest Christian writer on homiletics is St Augustine, whose book *De Doctrina Christiana* is in some sense an adaptation of profane rhetoric to sacred uses Rabanus Maurus and Isidore of Seville also incidentally treat the subject, but the nearest approach to a systematic treatment in mediæval literature is to be found in Humbert, *De Eruditione Concionatorum* St Carlo Borromeo's *Instructiones Pastorum* was a part of his general scheme for the improvement of clerical education, and in the ecclesiastical course, as well of Catholics as of Protestants, homiletics occupies an important place Books on homiletics have been written by Bautain, Broadus, Claude, Dabney, Hoppin, Kidder, Phelps, Shedd, Storrs, Vinet, and many others An important series of volumes have resulted from the Lyman Beecher lectureship (at Yale) on preaching, among the writers being Henry Ward Beecher (1871), Phillips Brooks (1876), Washington Gladden (1886; 1902), G A Smith (1898) Lyman Abbott (1904), J H Jowett (1912), C S Horne (1914)

HOMILIA'RIMUM (ML, from Lat *homilia*, Gk *ὁμιλία*, *homilia*, conversation, homily). A collection of homilies for the use of the clergy, either to read to their congregations or for their own edification The use of homilies of others dates as early as the sixth century, and in the eighth century collections were in use The homilies of Leo I were used at an early time Collections were made in the eighth and ninth centuries by Alanus, Abbot of Faria, Smaragdus, Abbot of St Michaels, Haymo, Bishop of Halberstadt, Rabanus Maurus, and Eric of Auxerre The homilies of the Venerable Bede were in familiar use among the clergy in all parts of the West, and we find in the letters of the early mediæval time traces of an interchange of sermons, original or otherwise, between bishops and clergy, even in distant countries Alcuin made an *homiliarium*, which, strangely enough, considering its author, passed out of mind and was only discovered in 1892. What since the fifteenth century has been called his is really a revision of that by Warnefried mentioned below One of the many reformatory measures of Charlemagne was a compilation of homilies under the title of *Homiliarium*, which was made under his direction by the deacon,

Paul Warnefried, a monk of Monte Cassino and one of his chaplains. It was compiled in the end of the eighth century and contains homilies for all the Sundays and festivals of the year. It is the most famous of these collections. Maximus of Turin (fifth century, homilies in Migne, *Patrol Lat.*, LVII) is more drawn upon than any other author, but Bede comes next, and then Leo the Great, Gregory the Great, Augustine, and others. The language was, of course, Latin. Many synods directed the clergy to translate these sermons for their flocks, and the collection continued in use for this purpose down to the sixteenth century. It was printed at Speyer in 1482 and again at Cologne in 1537 and is reprinted in Migne, *Patrol Lat.*, xcv. Alfred the Great translated the homilies of Bede into Anglo-Saxon, and Ælfric added many others. A collection of English homilies turned into verse, that they might be more readily remembered by the people, appears to have been composed about the middle of the thirteenth century. This collection, affording a metrical sermon for every Sunday and festival day in the year, exists in manuscript, and a portion of it was edited with introduction and notes by John Small, librarian to the University of Edinburgh (*English Metrical Homilies*, Edinburgh, 1862). When the Reformation was introduced into England, the unfitness of the clergy to preach was so keenly felt that a book of homilies was prepared and sent forth by authority of Edward VI (1547), and again under Elizabeth (1563) a second book, and the reading of these homilies was enjoined. The two books were reprinted at Oxford, 1859. See **HOMILY**, **HOMILIES OF THE CHURCH OF ENGLAND**.

HOMILIES (hōm'ī-līz) OF THE CHURCH OF ENGLAND. A collection of sermons, the first part of which was published in 1547, the first year of the reign of Edward VI, to be read in the churches, partly in order to supply the defect of sermons, but partly also to secure uniformity of doctrine and to guard against the heterodoxies, old and new, which threatened the unconsolidated Church. The second part was published in 1563, at the same time with the Articles, under Elizabeth. The titles are 21 in number. The homilies are not now read in churches, but they are frequently appealed to in controversies as to the doctrine of the Anglican church on the points of which they treat. The precise degree of authority due to them is matter of doubt. Consult Griffiths, *Homilies Appointed to be Read in Churches* (Oxford, 1896).

HOMILY. In ecclesiastical usage, a discourse held in the church and addressed by the minister to the congregation. The practice of explaining in a popular form the lessons of Scripture read in the synagogues had prevailed among the Jews and appears to have been adopted in the Christian churches from the earliest times. The discourses employed for this purpose were of the most simple character, but with the exception of one ascribed to Hippolytus (qv), we have no sample of this form of composition earlier than the homilies of Origen in the third century. Taking these as a type, the early Christian homily may be described as a popular exposition of a portion of Scripture, accompanied by moral reflections and exhortations. It differs from the sermon (Gk λόγος, Lat *oratio*), whose form was influenced by the rhetoric of the schools, in eschewing all oratorical

display and in following the order of the scriptural text or narrative instead of being thrown into the form of a rhetorical discourse or a didactic essay. The schools of Alexandria and Antioch appear to have been the great centres of this class of sacred literature, and in the early centuries and mediæval times many preachers continued to use the homiletic form, and even in the modern Church many have regarded it as the best medium of scriptural instruction. See **HOMILIARUM**, **HOMILETICS**, **HOMILIES OF THE CHURCH OF ENGLAND**.

HOMINE REPLEGIANDO, hōm'ī-nē iē-plē-ji-in'do (ML., for replevying a man). The title of an old writ in English law, meaning 'to bail a man out of prison'. It was an ancient form of the writ of habeas corpus, by the later form of which, as now employed, it has been superseded in England and generally in the United States. In a few of the American States, however, the older writ has recently been revived in an amended form, as being better adapted to the purpose of securing the release of a prisoner on bail than the more usual writ of habeas corpus (qv).

HOMING (hōm'ing) PIGEON, or **HOMER**. The name among fanciers for that breed of domestic pigeon, also called "carrier," used in carrying messages and in long-distance races. The name refers to its propensity for returning to its home with the utmost possible speed and directness when liberated at a distance. See **PIGEON**.

HOMINIDÆ (Neo-Lat nom pl, from Lat *homo*, man). The family to which man belongs, and which, together with the various families of monkeys, baboons, and apes, forms part of the order PRIMATES. Among the characters which distinguish the Hominidæ are (1) the posture is completely erect, (2) the anterior appendages are provided with hands, the posterior with feet, (3) the feet have the inner digit greatly enlarged and nonopposable, forming a great toe, (4) the body is sparsely haired, except on the top of the head, (5) the lower jaw has a prominent ridge, the chin, (6) the facial angle exceeds 60°, (7) the brain is more than double the size of that of apes, and the cranial capacity three times as much, (8) the teeth stand in an uninterrupted series without a space in front of the upper incisors, (9) man has the power of speech. In his general organization man is so closely related to the higher apes that it is difficult to draw a hard and fast line between the Hominidæ and the lower groups. (See *Anthropoid Apes*, under **APE**.) In the zoological classification living races are considered as *Homo sapiens*. Various specific names have been proposed for extinct types of man, as *H. primigenius*, *H. heidelbergensis*, *H. aignacensis*, *hauseri*, *H. moustereensis*, *hauseri*, *H. eoanthropus dawsoni*. A complete scheme of classification will be found under **MAN**, **SCIENCE OF**.

HOMMEL, hōm'mel, FRITZ (1854-) A German Orientalist, born at Ansbach. He was educated at Leipzig and in 1877 became connected with the library of Munich and was made docent of the university, in which he was appointed professor of Semitic languages in 1885. His principal writings, aside from contributions to Oriental journals, are: *Die Namen der Säugethiere bei den südsemitschen Völkern* (1879), *Zwei Jagdinschriften Assurbampals* (1879), *Die semitischen Völker und Sprachen* (1883), *Geschichte Babylonens und Assyriens* (1885); *Die babylon-*

nische Ursprung der ägyptischen Kultur (1892), Aufsätze und Abhandlungen arabistisch-semitologischen Inhalts vols I-III (1892-1901), Sudarabische Chrestomathie (1893), Die altisraelitische Ueberlieferung in inschriftlicher Beleuchtung (1897); Sumerische Lesestücke (last ed, 1899); Der Gesträndienst der alten Araber (1900), Die alorientalischen Denkmäler und das alte Testament (2d ed, 1903), Grundriss der Geographie und Geschichte des alten Orients (1st part, 1904), Geschichte des alten Morgenlandes (2d ed, 1908)

HOMME QUI RIT, L', lôm' kē rē' (Fr. The Man who Laughs) A romance by Victor Hugo (1869), the story of a boy whose face has been mutilated so that he always has the appearance of laughing

HOMO See HOMINIDÆ

HOMŒOCE/LA See HETEROCE/LA

HOMŒOPATHY (from Gk. *ὁμοπαθήθεια*, *homoiopathēia*, similarity of feeling, from *ὁμοπαθής*, *homoiopathēs*, subject to like feeling, from *ὁμοιος*, *homios*, similar + *πάθος*, *pathos*, feeling) A distinctive system of medicine elaborated by Samuel Hahnemann (q.v.) upon the suggestions of a number of predecessors and published in 1796 His chief dicta enunciated at that time were as follows

"Every powerful medicinal substance produces in the human body a peculiar kind of disease, the more powerful the medicine, the more peculiar, marked, and violent the disease" "We should imitate nature, which sometimes cures a chronic disease by superadding another, and employ, in the disease we wish to cure, that medicine which is able to produce another very similar artificial disease, and the former will be cured, *similia similibus*" He was brought to this conclusion through observing the toxic effects of drugs, as recorded in the various works on *materia medica*, which he was translating from English into German, and by experiments made upon himself and others in corroboration. It is not claimed that Hahnemann first noted similarity of drug action and diseased condition, for many times in previous medical history had isolated instances been noticed, but he was the first to urge a general application of his principles and to state the propositions upon which was based the new treatment In 1806, in a treatise entitled *The Medicine of Experience*, he indicated the name by which the new system of treatment should be known, and thenceforward "homœopathy" designated the science and art, as did "homœopathic" the practitioner.

In 1810 he published the *Organon of Rational Medicine*, which became and remains the embodiment of the fundamental methods of homœopathy These fundamentals may be stated briefly thus

1. Proving of medicines upon the healthy
2. Selection and administration of medicines according to the law of similars.
3. The single remedy
4. The minimum dose

A medicine is "proved," according to the homœopathic method, as follows A fluid extract or a tincture of a drug is selected for proving Of this medicinal preparation a dose of one drop, two drops, or five drops is given to a healthy person at certain intervals, during which the person notes his symptoms Gradually increasing doses are administered until the experimenter is satisfied and a set of tables of symptoms, believed to be caused by the drug in

the healthy person, has been compiled These tables of symptoms are then compared with symptoms noted in various diseases Upon discovering that a disease presents a similar set of symptoms to those noted by the healthy person as caused by the test drug, the homœopathist argues that this drug will be the remedy for this disease His method of reasoning is that if a drug produces certain symptoms in health it will cure a disease which causes similar symptoms Upon this basis lies the fundamental law of similars," generally stated in Latin, *similia similibus curantur*

In the way just described Hahnemann proved upon himself and others more than 90 drugs Societies were formed for the purpose, and since his death many medicinal substances have been tested to learn toxic, pathogenic, and curative power, if any Thus, each drug had its pathogenesis, or "picture," and the one corresponding to the totality of diseased symptoms as elicited from the patient by the physician, if administered, would, according to the homœopathic claim, result in a cure No two drugs having precisely the same picture and no two patients the like totality of symptoms, he therefore individualized his cases and declared that a single remedy should be given Later in life he modified this to some extent and, recognizing the *genus epidemicus*, prescribed without seeing the patients, as in the cholera epidemic of 1831

When he began prescribing according to his law, he gave massive doses, but, believing that the human system when diseased is much more sensitive than in health, he gradually lessened the quantity Then it was that he wrote the *Spirit of the Homœopathic Doctrine*, in which he argued the morbid cause of disease and the dynamization of remedies In regard to disease, Hahnemann recognized the *morbid cause*, which, acting upon the *morbid properties* in the tissues, developed disease Therefore, he argued, disease is a morbid property developed into an active pathological state by the influence of a corresponding morbid force Likewise regarding drugs, his idea was that the drug forces are cosmic principles or agents of the same order as the disease-developing forces, the germinal principles inherent in the plant correspond with the morbid properties in the tissues, and drugs correspond with the fully developed disease He believed that the morbid cause is in closer affinity with the drug than with the tissues of the organism, and this union secures the restoration of the organism to a state of physiological harmony He said, 'As the human organism, even in health, is more readily influenced by drugs than by natural morbid agents, this influence is felt in the highest degree by an organism which is properly predisposed by disease, provided the artificial drug disease is homœopathic to the natural malady Hence the smallest dose of the remedial agent is sufficient for a cure, for the spiritual power of the medicine does not in this instance accomplish its object by means of quantity, but by potentiality and quality, a larger dose might be injurious for this reason, that a larger dose does not only not overcome the morbid affection more certainly than the smallest possible dose of the homœopathically administered agent, but likewise imposes a complex medicinal disease, which is always a malady, though it runs its course in a shorter time" Herein lie the doctrines of small doses and "medicinal aggravations." From this mode of

accounting for a cure in accordance with the law of similais, there naturally followed the "potentization" of drugs, according to Hahnemann.

The attenuation was accomplished in the following manner. If the drug was a vegetable substance, a strong tincture was made and called mother tincture. Of this, two drops were taken, added to 98 drops of alcohol, and agitated. This was marked "first dilution." Two drops of this, with 98 drops of alcohol constituted the second dilution, the third in a similar manner, and so on. This constituted what was known as the centesimal scale. Some preferred adding one drop of tincture to nine drops of alcohol, the label being first decimal, second, third, etc., according to the number of attenuations desired. Insoluble substances were triturated with sugar of milk in the proportion of one grain of the drug to 99 of sugar, or 9, as the physician deemed best. When the fifth trituration was reached, the substance, now claimed to be soluble, was dissolved in distilled water, and the further process carried on with alcohol as in the case of tinctures.

Hahnemann writes, quoting from the first American edition of the *Organon of Medicine* (Philadelphia, 1836) "Diseases are *dynamic* [spiritual] aberrations, which our *spiritual* existence undergoes in its mode of feeling and acting—that is to say, *immaterial* changes in the state of health" (p. 19). "A homœopathic dose, however, can scarcely ever be made so small as not to amend and, indeed, perfectly cure" (p. 157). "It will stand good as a homœopathic rule of cure, refutable by no experience whatever, that the *best dose* of the rightly selected medicine is ever the *smallest*" (p. 187). When describing the preparation of "potences" of fluid dilutions, the author says "These manipulations are to be conducted thus" (by adding 2 drops of a preceding "potence" to 98 drops of alcohol and shaking twice) "from the first up to the thirtieth or decillionth development of power, which is the one in most general use" (p. 200). "The effect of shaking, on homœopathic medicines, 'is so energetic that latterly I have been forced by experience to reduce the number of shakes to two, of which I formerly prescribed ten to each dilution'" (p. 205). "The best mode of administration is to make use of small globules of sugar, the size of a mustard seed, one of these globules having imbibed the medicine, and being introduced into the vehicle, forms a dose containing about the three-hundredth part of a drop, for three hundred of such globules will imbibe one drop of alcohol." "By placing one of these on the tongue, and not drinking anything after it, the dose is considerably diminished. But if the patient is very sensitive, and it is necessary to employ the smallest dose possible, and attain at the same time the most speedy results, it will be sufficient to let him smell once" (p. 207).

The directions for smelling a "remedy" are as follows. "The patient should hold the phial containing the globule under one nostril, when one momentary inhalation of the air in the phial is to be made, and if the dose is intended to be stronger, the same operation may be repeated with the other nostril" (p. 191). Hahnemann considered mesmerism a homœopathic remedy. He says, "This curative power, of whose efficacy none but madmen can entertain a doubt, which through the powerful will of a well-intentioned individual influences the body of the patient by the touch, acts homœopathically, by exciting

symptoms analogous to those of the malady" (p. 210).

In 1813 an epidemic of typhus fever occurred in Leipzig, during which it is said that 73 patients were allotted to Hahnemann for treatment. Of these it is claimed that but one died. Many of his claims were denied, and many of his ideas were ridiculed. As a result of the opposition of the apothecaries' guild, he was forbidden to prepare his own medicines for pay. In spite of all opposition he and his pupils continued their practice and gave the remedies gratuitously when they were not allowed to take pay. Finally opposition and social ostracism so discouraged Hahnemann that he left Leipzig in 1820 for Rothen, where under the patronage of the Duke of Anhalt, he had a certain vogue. Up to this time homœopathy was centred in the person and teachings of Hahnemann, but now that he was absent, his pupils, already having become doctors of medicine, began, in 1821, the publication of the first homœopathic journal, the *Archiv of the Homœopathic Method of Curing*. This publication was continued until 1843. The growth of homœopathy in Germany has ever been slow. In Austria homœopathy was first officially known in 1819, in which year the Emperor Francis I decreed that the method should be forbidden. Afterward it was tacitly permitted, and the decree was revoked in 1837. Since 1846 there has been no governmental interference with individual preference. Homœopathy was introduced into Russia in 1823. There, as elsewhere, its pioneers were laymen and its growth has been slow. It was introduced into Great Britain in 1827 by Quin, a physician. Shortly after, the medical opposition was so great as to prevent those who desired to practice it from obtaining a decree entitling them to register as physicians. At present there are no restrictions placed upon any person desiring to practice this system, but there are no legally incorporated schools for instruction. In France homœopathy was first systematically tried in the year 1830. It steadily grew in favor until 1835, when Hahnemann, settling in Paris, gave the cause a powerful impetus. He grouped around him a large number of able men, and until his death in 1843 Paris was the Mecca of homœopathy.

The laws of France, as of most countries in Europe, discriminate against homœopathy, and no place of public preferment or emolument is allowed its adherents. As a rule, homœopathic medical colleges are not legalized in European countries.

In the United States and in other young countries homœopathy has been most active. Dr. Hans B. Gram, a native of Boston, educated at Copenhagen, first began the practice of homœopathy in New York City. The novel method was adopted by many, and many became earnest advocates of the system. Later, and about the same time, there came into notice men and women, generally and very largely of the laity, who, without knowledge of disease or of science, began to report cures with the aid of homœopathic "remedies." Domestic practice was so easy by means of a cabinet of phials filled with globules and a book giving complete instruction for the use of homœopathic medicines as adapted to any symptoms, without the need of a diagnosis of disease, that the new cult grew rapidly. Soon there came from over the sea men who had learned the science and art from Hahnemann and his associates, and, as a help to the more perfect

understanding of this way, the first homœopathic college was established at Allentown, Pa., in the year 1835. While the converts to homœopathy have never been subjected to positive repressive legislation, yet they have been buffeted by the same storm of opposition as greeted their brethren in other lands. In order that the cause might be strengthened and physicians record progress, the publication of the *American Journal of Homœopathy* was begun in 1835. The American Institute of Homœopathy, the oldest national medical association in the country, was organized in 1844, though there were already societies in the States of Pennsylvania, New York, and Massachusetts. The existence of most of the local societies is mainly due to the suggestion and fostering care of the American Institute, to which they annually report.

In 1914 there were in the United States about 15,000 homœopathic physicians, and 10 medical colleges in which homœopathic therapeutics were taught. These schools had an attendance of 794 students and graduated 154. Considering its age, homœopathy is especially rich in theoretical and practical literature. The most exhaustive work on any division of the subject is the *Encyclopædia of Materia Medica*, by the late Prof. T. F. Allen, M.D., of New York City. Every department of medicine has been treated by homœopathic authors. Perhaps the chief factor in the spread of homœopathy in the United States, especially in the newer portions of the West, is the equality of all schools of medicine and all qualified practitioners before the law. For many years homœopaths in America taught only therapeutics and practice, and as a result all the earlier, and for many years most of the well-equipped, native American physicians were graduates of the regular school. Finally homœopathic medical schools were established, in which all the branches of medicine were taught, and the inexplicable terms "homœopathic surgeon" and "homœopathic obstetrician" came into use. The influence of the school has been waning for some years. In 1883 the *Hahnemannian Monthly* said: "A few years ago the editors of the *New York Medical Times* dropped from the title of their journal the distinctive word 'Homœopathic'; now they boldly urge the renunciation of the word as applied to our school of medicine. If we are emancipated from the thralldom of sect, we shall not only save our school from imminent dissolution, but shall also become an integral part of the medical profession of the day, honored as true, broad, liberal, progressive physicians. But if we cling to a name which by no means represents the catholicity and spirit of the new school, we are doomed to annihilation."

In the large cities of the Eastern States great numbers of graduates of homœopathic medical schools have taken courses of study in post-graduate departments of regular medical colleges, and afterward, while retaining the term "homœopathic," practice medicine principally according to the regular principles, using "old-school" drugs in "old-school" dosage. The number of exclusively homœopathic physicians is much less now than it was 25 years ago.

Whether due to its influence or not, since the advent of homœopathy the repulsiveness in taste and appearance as well as the size of the dose of old-school remedies have been greatly modified; and in a vast number of cases suggestion and encouragement, together perhaps with place-

bos, have taken the place of active medicinal treatment, and natural recuperative power has worked the cure. It is certainly true that the two schools have drawn nearer to each other, and each one has adopted something of the *materia medica* of the other. Few and rare to-day are the practitioners who adhere to the higher potencies of Hahnemann.

The terms "allopathy" and "allopathic" came into use after the invention of the words "homœopathy" and "homœopathic" and were used by the adherents of the new school in designating the old school and its practitioners, through a mistaken idea. The terms are etymologically incorrect. Consult W. H. King (ed.), *History of Homœopathy and its Institutions in America* (4 vols., New York, 1905), and S. C. F. Hahnemann, *Organon of the Rational Art of Healing* (1b, 1913). See the article **HÄHNEMANN**.

HOMŒOPATHY, AMERICAN INSTITUTE OF The oldest national medical organization in the United States, its first session having been held in New York City on April 10, 1844. Its objects are the reformation and augmentation of the *Materia Medica* and the furthering of the principles of homœopathy. It had (1914) 3048 members, representing every State in the Union, besides Canada, divided into bureaus on various lines of medicine and surgery, and meets annually in the large cities of the country. The institute publishes annual volumes of "Transactions," including reports and original papers. President (1914), Byron E. Miller, M.D., Portland, Oreg.

HOMOGENEITY, LAW OF The product of two homogeneous integral functions of the m th and the n th degree respectively is a homogeneous, integral function of the $(m + n)$ th degree. The value of this principle in checking the process of multiplication of homogeneous functions is evident. The notion of homogeneity may be extended to irrational and fractional functions. In this case the degree is determined by introducing a factor k into each variable and observing the degree of the factor k in the resulting function.

HOMOGRAPHY. See **HOMONYMS**.

HOMIOIUSION, $h\acute{o}m\acute{o}i-\acute{o}\acute{o}'s\acute{i}-\acute{o}n$. See **HOMOIOUSION**.

HOMOLOGATION (from *ML. homologare*, to homologate, from *Gk. δμολογέιν, homologein*, to agree, from *δμολογος, homologos*, agreeing, from *δμός, homos*, same + *λόγος, logos*, word, from *λέγειν, legen*, to say). In the civil law, the judicial confirmation of an award, or of an accounting, or any other administrative or judicial proceeding, which was taken or performed without competent authority, or whose authority is in doubt. In Scots law the term denotes any act or course of conduct which confirms an act which would otherwise be invalid. Thus, an informal deed, though ineffectual in itself, may yet, if acted on by one or both parties, be set up and enforced against the party. In this sense, then, homologation is the equivalent of a form of estoppel (*qv*) in English and American law. To constitute homologation a clear knowledge of what the party is doing is necessary.

HOMOLOGOUS SERIES. See **HYDROCARBONS**.

HOMOLOGY (from *Gk. δμολογία, homologia*, conformity, from *δμολογος, homologos*, harmonizing, from *δμός, homos*, same + *-λογία, -logia*, account, from *λέγειν, legen*, to say) 1. In biology, a term used to indicate structural corre-

spondence based on blood relationship, as opposed to analogy, which is applied to functional resemblance, such as that between the wings of a bird and those of a butterfly. Different sorts of homology have been recognized. There is the homology of the different parts of the body, viz., serial homology, as of the front and hind paired fins of fishes, or the arms and legs of man, antimeric homology, as of the petals of a flower or the right and left sides of the body. There is homology of corresponding organs in different individuals. This is most certain in individuals of the same species, somewhat less certain between genera and families, often doubtful between orders and classes, usually speculative between phyla. The criteria of homology are (a) The criterion of connections. A part having similar relations in two species and making similar connections is homologous in the two cases. (b) The criterion of structure. Homologous parts have a fundamental similarity of structure. (c) The criterion of development. Homologous organs arise from the same germ layer in corresponding parts of the body and develop in the same fashion. Despite these clear-cut criteria, homologies are practically often very difficult of determination, particularly beyond the limits of a class.

2 In geometry, figures which are in perspective are often spoken of as homologous, because the centre and axis of perspective introduced by Poncelet were called by Chasles centre and axis of homology. (See PERSPECTIVE, CENTRE, AXIS.) The term "homologous" is also used in the sense of "corresponding." Thus, corresponding sides or angles of similar polygons are said to be homologous.

HOMONYMS (Fr. *homonyme*, Lat. *homonymus*, from Gk. *ὁμώνυμος*, *homónymos*, having the same name, from *ὁμός*, *homos*, same + *ὄνομα*, *ónoma*, name). Words that agree in form, but differ in origin and meaning. A familiar example of this class of words is *sound*, which in its different meanings goes back to the Latin *sonus*, Scandinavian *sund*, and Anglo-Saxon *gesund* and *sundian*, or the verb *beor* and the noun *beor*. Many homonyms are often distinguished by the accent, as *absent*, the adjective, and *absent*, the verb. Strictly speaking, these are not homonyms, but homographs, since the exact correspondence is confined to the spelling. A third term is also used—"homophones," words that agree in the sound, but not necessarily in the spelling. Thus *write*, *wright*, and *rite*, or *meat*, *meat*, and *mete*, are homophones.

HOMOOUSSION, *hómō-ōs'si-on* (Gk. *ὁμοούσιον*, *homooousion*, consubstantial, from *ὁμός*, *homos*, same + *οὐσία*, *ousia*, essence). A term of Greek theology, employed against the Arians at the Council of Nicea (325 A.D.), to denote that in the doctrine of the Trinity the Son is "of the same essence [or substance] with the Father." According to the received text of what we call the Nicene Creed, the article in question reads: "And [I believe] in one Lord Jesus Christ, being of one substance with the Father." The word *homooousion* is much older than the Council of Nicea. Not to speak of its employment by Gnostics, like Basilides, it is found in the writings of Irenaeus, in the latter half of the second century, and not infrequently in the third century. It was rejected by a synod held in Antioch, against Paul of Samosata (268 or 269), where it seems to have borne a meaning somewhat different from that which was applied to

it by Athanasius. In the fourth century the word aroused a long and bitter controversy. The Athanasian party defended it, the Arians attacked it on every side. In the progress of the struggle various alternatives were proposed. Some extreme Arians wished to substitute *heteroousion* (of a different substance) for *homooousion*, thus affirming the direct opposite of what the orthodox party insisted upon. Others, less radical and largely indifferent to the real issue involved, suggested the colorless term *homoion* (similar), meaning simply the Son 'is like' the Father. The greater part were willing to go so far as to use the word *homooousion* (i.e., the Son is 'of a like essence, or substance,' with the Father). This use of *homooousion* gave rise to the epigram that the quarrel was over a diphthong, but the serious theological problem was whether the Church worshiped one divine being in two persons, or two divine beings, God and Christ. After nearly 60 years of theological warfare the Church, at the Council of Constantinople (381), reaffirmed its allegiance to the *homooousion* doctrine and now applied it not simply to the Son, but also to the Holy Ghost, thus completing the dogma of the Trinity, which has ever since remained the orthodox faith of Christendom.

Consult I. A. Dorner, *Doctrine of the Person of Christ* (Edinburgh, 1861-63), K. J. Hefele, *History of the Christian Councils from the Original Documents*, translated from the German and edited by W. R. Clark (ib., 1871), J. H. Newman, *The Arians of the Fourth Century* (5th ed., London, 1888), Athanasius, *Select Works*, translation in the *Nicene and Post-Nicene Fathers*, 2d series, edited by Schaff and Wace, vol. iv (New York, 1892), Dubose, *The Ecumenical Councils* (2d ed., ib., 1897); Adolf Harnack, *History of Dogma*, vol. iv (Boston, 1898), J. F. Bethune-Baker, *Meaning of Homooousios in the Constantinopolitan Creed* (New York, 1908). See ARIUS, ATHANASIUS, CHRISTOLOGY, NICENE CREED.

HOM'OPHONES See HOMONYMS, HOMOPHONY.

HOMOPH'ONY (Gk. *ὁμόφωνος*, *homophōnos*, having the same sound, from *ὁμός*, *homos*, same + *φωνή*, *phōnē*, sound). The style of modern music where one voice or melody predominates. The other voices are not independent, but serve chiefly to furnish the harmonic basis for the leading voice. Thus it is directly opposed to the older polyphony (qv), where all voices were independent and of equal importance. See ANTI-PHONY; MONODY.

HOMOPLASY (from Gk. *ὁμός*, *homos*, same + *πλάσις*, *plasis*, molding, from *πλάσσειν*, *plassein*, to mold). A term proposed by Lankester to express, as he says, "the parallelism of genetically distinct organs." Its meaning by some is expressed by the word "convergence," now in frequent use. It is due to the action of similar or identical habits or environment on a part or parts of an animal or on the entire animal. Lankester's definition is: "When identical or nearly similar forces, or environments, act on two or more parts of an organism which are exactly or nearly alike, the resulting modifications of the various parts will be exactly or nearly alike." Lankester illustrates homoplasy by the case of the remarkable coincidence in the pteropod mollusks and cephalopod mollusks of appendages around or near the mouth provided with suckers. Osborn asserts that homoplasy

has been confused with "parallelism" and "convergence," which may affect absolutely non-homologous structures. *Homoplasmy*, he says, should be confined to structures in which there is an element of homology. *Convergence* may be restricted to cases of "parallelism" between animals of entirely unrelated groups or classes, like the following. marsupial mice, and other animals of that group exactly resemble placental mice, etc., whales resemble fishes owing to their similar adaptation to the water. Many cases of so-called mimicry (qv) appear to be instances of convergence. Legless lizards may be mistaken for snakes. There are multitudes of such examples, and the resemblance or parallelism is so exact as to have often misled well-trained zoologists.

HOMOPTERA (from Gk. *ὁμός*, *homos* same + *πτερον*, *pteron*, wing). A suborder of the Hemiptera, including insects with wings (when present) of uniform thickness throughout. It contains some of the most destructive of insects and others that are the most beneficial. It includes the cicadas, lantern flies, spittle insects, leaf hoppers and tree hoppers, plant lice, scale insects, and others. A few of the scale insects furnish materials that are useful to man, such as cochineal lac and wax. A famous scale insect is the "San Jose" scale, and the mealy bugs of greenhouses are well-known representatives of this group. See HEMIPTERA. BUG, COCHINEAL, APHID, CICADA, FROTH FLY, SCALE INSECT.

HOMOSPORY (from Gk. *ὁμός*, *homos*, same + *σπόρος*, *sporos*, seed—lit., spores similar). A word generally used only in connection with such plants as have a distinct alternation of generations (qv.). The sexless generation (sporophyte) in the alternating series produces spores, which in turn produce the sexual generation (gametophyte). Among the liverworts and mosses (Bryophytes), and in most of the ferns and their allies (Pteridophytes), these spores are all alike in appearance and power, each in germination producing a gametophyte which bears both male and female organs. The term contrasts with "heterospory" (qv.), a condition in which the sporophyte produces two kinds of spores, unlike in size and power, the larger of which produce female gametophytes, the smaller male gametophytes. All the seed plants (Spermatophytes) are heterosporous, as well as the water ferns, quillworts, and little club mosses among the Pteridophytes. Isospory is the same as homosporous.

HOMOTAXY, or **HOMOTAXIS** (from Gk. *ὁμός*, *homos*, same + *τάξις*, *taxis*, arrangement, from *τάσσειν*, *tassein*, to arrange). A geological term which signifies a similarity in the succession of strata in different regions as shown by the included life forms.

HOMS, *hōms*, or **HEMS**, *hēms* (Lat. *Emesa*). A city of Syria, situated near the right bank of the Orontes, 1860 feet above sea level, 36 miles south of Hamah by rail (Map Turkey in Asia, C 3). A branch railroad line to Tiupoli on the coast was opened by a French company in 1911. The old town, built chiefly of black basalt, has crowded houses and narrow streets and is surrounded by old half-ruined walls and commanded by a ruined citadel. Although there are now no ancient buildings, numerous fragments of columns with Greek inscriptions, and the foundations of ancient baths with specimens of mosaic pavements, remain. The town has considerable trade in silk, cotton, oil, and gold ware,

and has also some manufactures. Pop (est.), 60,000, including about 16,000 Christians. Homs (ancient Emesa) was celebrated chiefly for its splendid temple of Baal the god of the sun, one of the priests of which, Elagabalus, or Heliogabalus, was raised to the Imperial throne of Rome. Under the walls of Emesa Zenobia was defeated by the Emperor Aurelian in 272 A.D. The city was taken by the Saracens in 636, when its old Semitic name, Hems, was revived. In 1099 the Crusaders rode through its opened gates. Here the Egyptian army, under Ibrahim Pasha, defeated the Turks in July, 1832.

HOMURAI, *hō'mōo-rī*. See HORNBILL.

HONAN, *hō'nan'* (Chin., south of the river). One of the 18 provinces of China proper, bounded on the north by the provinces of Shansi and Chili, on the east by Shantung, Kiangsu, and Anhui, on the south by Hupeh, and on the west by Shensi (Map China, K 5). It lies between lat 32° and 37° N and long 110° and 116° E, area, 67,954 square miles. The eastern part is comparatively level and belongs to the Great Plain, while in the western section spurs of the Fu-niu Range of mountains with a southeast trend are found. Its principal river is the Hoang-ho, which traverses the northern part from west to east. The soil is fertile and, in addition to the usual cereals, produces cotton, hemp, indigo, and tobacco. Patches of the remarkable formation called loess (qv) by Richtenhofen and "lake loam" or terrace deposit by Pumpelly are found in both the northern and southern parts. Honan is rich in minerals, iron, lead, tin, copper, etc., and has enormous deposits of anthracite and bituminous coal, which is mined only by native methods. It has been recently proposed to develop the mines by modern methods. The capital, Kaifeng (or Kaifung), is situated 11 miles south of the Hoang-ho and near the point where in 1853 the river burst its banks and took a new course to the northeast through Shantung to the Gulf of Pechili, instead of southeast through Kiangsu to the Yellow Sea, as formerly. Kaifeng is a station on the new *Lu-Han* or Hankow-Peking Railway. It is noted for its ancient colony of Jews, who built a synagogue there as early as 1183 (See KAIFENG). Colonel Mamford (1905) reported that the Chinese of this province wished railroads and had other progressive ideas. Pop (Chinese est.), in 1910, Minchengpu, census, 22,375,000. Construction on the Kaifeng-Honan Railway began in 1905, and the road was opened to traffic in 1908. It is 140 miles long and forms a junction at Chenchow with the Peking-Hankow Railway. It is in a prosperous condition, and several extensions are planned. As Honan is a rich province without navigable rivers, its prosperity will largely develop with advancing railway construction.

HONDA, *ōn'da*. A city of Colombia, situated on the Magdalena, in a mountainous region, 55 miles northwest of Bogotá. The town has a very hot climate, as the surrounding mountains shut off the cool winds. It is important as the head of navigation, and the transit point of the trade for Bogotá, as well as the depot for the tobacco and quinine from the Ambalema District. Pop, 1912, 8225. Honda received its town charter in 1643. In 1805 it was destroyed by an earthquake.

HONDA, *hōn'da*, YORITSU (1848-1912). A Japanese Methodist Episcopal bishop and educator. The son of a chief of the Samurai class in his

province, he was born at Hiro-saki on the island of Hondo. When a student in Yokohama, he was converted to Christianity, and in 1872 he was baptized and became a charter member of the first Protestant church organized in Japan. For some time he was a member of the local assembly of his province. In 1878 he was ordained a local elder of the Methodist Episcopal church—the first minister of the denomination in his country. After going to the United States to attend Drew Theological Seminary in 1889 and 1890, he returned to be president of the Aoyama Gakuin, or Anglo-Japanese College of the Methodist Episcopal church. In this position he remained until the Methodist church of Japan was organized in 1907, when he was elected its first Bishop. An ardent Y. M. C. A. worker, he twice represented his country in World's Student Federation conferences in Europe, in 1910 he was again in America, as fraternal delegate to the general conferences of the Methodist Episcopal Church South and of the Methodist Church of Canada. In the same year he was a member of the World's Sunday School Convention at Washington, D. C., and of the World Missionary Convention at Edinburgh. For many years the Christians of Japan selected him as their representative on all important public occasions.

HONDECOETER, hōn'de-kōŭ'tēi, MELCHIOR D' (1636-95). A Dutch animal painter. His grandfather, GILLIS (died 1627), was a landscape painter at Amsterdam, and his father, GISEBERT D'HONDECOETER (died 1653), painted animals. Melchior was born at Utrecht and studied under his father and his uncle, Jan Weenix (q.v.). From 1659 to 1663 he lived at The Hague and after that at Amsterdam, where he received the freedom of the city in 1688 and resided until his death, April 3, 1695. He stood in high favor with the Dutch magnates, and while at The Hague was employed by William III. afterward King of England, to paint his menagerie. His grandfather had made a considerable name in that form of art. Hondecoeter painted every kind of animal, but his favorite subjects were cocks, hens, ducks, and peacocks, which he delineated with wonderful correctness and truth. He depicts, with great charm, motifs like the maternity of the hen, and he even lends beauty to subjects like "cockfights" and "Ducks in a Pond." No one has excelled or even equaled him in painting the feathered tribe. The landscapes which he introduced as backgrounds to his pictures are equally true to nature and finished with a delicate lightness and transparency of touch that harmonize admirably with the subject of the piece. The museums of France, Germany, and Austria and the private and public collections of England have fine examples of his work, but his masterpieces are at Amsterdam and The Hague. His most celebrated work is "La plume flottante" (Floating Plumage) in the Museum of Amsterdam, representing a pond full of waterfowl.

HONDO, hōn'dō, or **HON-SHU**, hōn'shyōŭ (Chūno-Jap., chief island). The name of the chief island of the Empire of Japan, often, but incorrectly, called Nippon or Nihon. Nippon is not the name of any one island, but of the entire Japanese Empire. The application of the erroneous name Nippon to the chief island originated with Kaempfer (q.v.), the Jesuits who wrote previously to him knowing Japanese geography too well to use the misleading term. Of late years the Japanese, studying geography in

the Western fashion, and seeing the necessity of a name for their chief island, have called it Hondo. Hondo lies between lat 24° 14' and 41° 33' N and long 130° 44' and 142° 14' E and has an area (with its isles) officially computed in 1894 at 87,482 square miles, with a population (1908) of 37,414,281. It comprises the encircles of Tokaido, Kinai, Tosando, Hokurikudo, Sanindo, Sanyodo and one province of Nankaido (the other four provinces of this encirc forming the island of Shikoku). For administrative purposes Hondo is divided into 34 fu and ken (or prefectures), 429 districts, 41 large cities, 930 towns, and 9219 villages. Of its taxable area in acres, 5,521,175 are in rice fields, 3,874,410 in arable land, 758,320 in building lots, and 14,697,336 in forest, 2,234,766 various, besides 501,188 acres of untaxed land. Its shape is a crescent, with horns towards Asia. A remarkable difference in climate is noted between the eastern and the western halves of Hondo—the former, under the influence of the Kuro-Shiwo, or gulf stream of the Pacific, being mild and warm, the latter, receiving the cold winds and under the influence of cold currents, having a more severe climate. The promontories of Hondo are now dotted with well-equipped lighthouses, and the island is well supplied with railways and telegraphs.

HONDURAS, hōn-dōŭ'ras, *Sp. pron. ñn-dōŭ'ras*. A republic of Central America, bounded by the Caribbean Sea on the north and northeast, Nicaragua on the southeast, Salvador and the Pacific Ocean on the southwest, and Guatemala on the west (Map Central America, D 3). Area, estimated at about 44,274 square miles. It is a mountainous country, a plateau in the interior, with low coast lands. The only plains of important extent are along the coasts of both oceans and on the lower courses of a few rivers. The widening of river valleys in the interior results in small plains, many of them at a considerable elevation. The mountains occupy a proportionately larger area than in neighboring Guatemala, but the ranges are inferior in extent and height, though some peaks rise to about 8000 feet. Volcanoes have recently played a smaller rôle than in any other country of Central America, though there are a number of extinct volcanoes one of which formed the island of Sacategrande in the Gulf of Fonseca. In the west half of Honduras young eruptive rocks cover as large an area as all the other geological formations together, while in the east half very little of the surface is formed of volcanic outpourings of recent geological times, though the older eruptive rocks are largely represented, particularly in the north. The coasts have a long Atlantic and a small Pacific frontage. The Atlantic ports are Trujillo, Ceiba, and Puerto Cortes. Amapala has one of the best natural harbors on the Pacific coast. The water parting between the Atlantic and Pacific rivers is far to the south, so that most of the drainage is to the Atlantic Ocean. Some of the Atlantic rivers are navigable, among them being the Coco or Segovia (known also as the Wanks), which forms part of the boundary with Nicaragua.

In the interior the climate is healthful and on the whole temperate. The coast lands, owing to their small elevation, have a much higher temperature. Honduras is swept by the trade winds and receives an enormous quantity of rain. The tropical vegetation is very luxuriant. The broad Atlantic coastal lowlands, however, re-

ceive much less rainfall than the mountain regions of the interior, where most of the water vapor brought by the east winds is condensed. The result is that though the eastern lowlands are covered with vast forests of mahogany, cedars, and other cabinet woods, in which also sarsaparilla and other medicinal plants abound, vegetation in the east is not so luxuriant as in the higher regions inland, where there are boundless forests of pines and other conifers so dense that one may travel for days without being able to see more than 100 yards in any direction. The dry season prevails from November to May, the Pacific coast being the drier. The Atlantic coast is not healthful for the white race, and its products are mainly those of the forest and tropical fruits. The interior, from 1500 to 7000 feet, produces tropical products in the lower zone, coffee in the middle zone, and the products of temperate climates in the upper belt. Numerous relics of a former civilization are found in some districts, most of them being the ruins of temples and other religious edifices.

For fauna, see NEOTROPICAL REGION

Mineral Resources. The country is richer in minerals than any other Central American state excepting Nicaragua. They include gold, silver, copper, zinc, iron, lignite, etc. Lack of capital and energy, however, has prevented large development. The mining activities are practically confined to the washing of gold from the rivers and the production of some silver in the southern part of the country, these metals being the largest exports.

Agriculture. The soil is very rich, but, in spite of its unusual fitness for agriculture, Honduras is the most backward state of Central America. The natural conditions are conducive to the cultivation of almost all the products of Central America, but the sparsity of population as well as the lack of transportation facilities stand in the way of agricultural development. More attention is paid to stock raising and to the cultivation of bananas and other fruits in the Atlantic coastal region than to any other branch of farming. Steamers carry a large quantity of bananas and coconuts to the United States. Tobacco, sugar, maize (the chief food staple), coffee, rice, etc., are all grown in quantities sufficient to supply the local demand, and considerable coffee is sold abroad. The almost prohibitive export duties have brought about a considerable increase in the live stock of the country. The exports of live cattle, however, as well as of hides, are not unimportant. Sheep, goats, and swine are few in number.

Transportation. With regard to transportation facilities the situation in Honduras is worse than in any other of the Central American states, although the natural obstacles in the way of a railway line from coast to coast are less than in most of the other states. The construction of a narrow-gauge line from Puerto Cortés on the Atlantic to the Gulf of Fonseca on the Pacific was begun in 1868 by an English company, which had secured from the government a land grant of 10 square miles per mile of road constructed, and extensive mining and lumbering privileges. Bonds to the amount of \$30,000,000 were issued and sold, but the work was discontinued after about 60 miles, or one-fourth of the road, had been constructed. Since then all efforts to resume construction have been unsuccessful, and the part completed, between Puerto Cortés and La Pimienta, has been operated with

varying success by several companies. A mule train is three weeks on the road between Puerto Cortés on the Atlantic and the Pacific port of Amapala, a journey that would take less than a day by rail. There are a number of other short railways, bringing the total mileage of the Republic to about 150. A number of concessions have been granted in order to improve the means of communication. There are a number of tolerable wagon roads, and a macadamized road connects Tegucigalpa with the port of San Lorenzo, but most of the traffic is still carried by mules. The telegraph lines of the country had 3812 miles of wire in 1912.

Commerce. The commerce of Honduras is less than that of any other Central American state, this being due largely to the general backwardness of the country. The imports in 1912 were \$4,317,314, of which 67 per cent came from the United States and lesser amounts from Great Britain, Germany, and France, in the order named. The exports in 1912 amounted to \$3,080,128, of which 88 per cent went to the United States and small amounts to other Central American states, Germany, and Great Britain, in the order named. The chief articles of import are foodstuffs, cotton manufactures, iron and steel manufactures, and chemicals. The largest single item of export is bananas, and then follow, in the order given, gold and silver cyanides and ores, coconuts, cattle, hides and skins, coined silver, coffee, rubber, tobacco, sarsaparilla, and cabinet woods.

Government. The constitution of Honduras, as promulgated in 1904, provides for a republican form of government. The executive power is vested in the President, elected by popular vote for a term of six years. The Chamber of Deputies, which is intrusted with the exercise of the legislative power, is composed of deputies elected directly for four years, at the rate of one deputy for every 10,000 inhabitants. The President is assisted in his duties by a cabinet of ministers. For administrative purposes the Republic is divided into 17 departments and one territory, administered by governors appointed by the President. The administration of justice is in the hands of a supreme court, situated at the capital, and a number of minor tribunals and justices of the peace. Municipal affairs are controlled by councils, elected by a direct vote of the people. The capital is Tegucigalpa.

Finance. The chief sources of revenue are customs duties and the spirits, powder, and tobacco monopolies. The revenue for 1913-14 was estimated at 4,824,000 pesos, and the expenditure at the same amount, of which about one-third was spent by the Department of War. The finances of the country are in a deplorable condition, owing to the expenditures incurred during the war with Salvador and Guatemala and to the continuous civil strife as well as to general mismanagement. Thus, the external debt of the country amounted on Jan. 1, 1914, to £5,398,570, while the arrears of interest at the same period amounted to £18,295,399, bringing up the foreign indebtedness of the country to £23,693,969. The internal debt amounted in 1912 to 6,625,206 pesos silver.

Defense. Military service is obligatory upon every able-bodied citizen between the ages of 18 and 40. The standing army, in 1910, had about 2000 men, and the reserve numbered 54,000 officers and men.

Population. The population of Honduras was

566,017 (official estimate) in 1911, exclusive of (uncivilized) Indians. Most of the population are called aboriginal Indians. The number of persons of pure European descent is very small. Religious freedom is provided for by the constitution, and no religion is officially recognized by the state. The prevailing religion is Roman Catholic, but there are also a number of Protestant churches. Education is supported by the state to a considerable degree, but the facilities are far from adequate. In 1911-12 there were 890 primary schools, with 35,703 pupils. At Tegucigalpa there is a university with faculties of medicine, science, law, and political science, at Comayagua there is a school of jurisprudence. There are four high schools, a normal school, and a school of arts and crafts, situated at Tegucigalpa, besides departmental colleges that receive subventions from the government. There are also normal and high schools at Juticalpa, Santa Rosa, and Santa Barbara. There is an agricultural school at Danli and a school for the manufacture of cigars and cigarettes at Tegucigalpa. As regards penal and charitable institutions, there are a penitentiary and general hospital at Tegucigalpa, also a hospital at Amapala.

History. The coast of Honduras was discovered by Columbus in 1502. The first settlement was made in 1524 by Cristóbal de Olid, a lieutenant of Cortés, sent to take possession of the country in the name of his commander. Olid founded the town of Triunfo de la Cruz and set up an independent government. Cortés set out in person to bring Olid to terms, and after a tedious march of six months over the mountains and rivers of Mexico and Central America, he reached the little colony in the spring of 1525. There he reinforced the colonists and founded the town of Natividad de Nuestra Señora, on Caballos Bay, returning to Mexico in 1526. A royal governor was appointed to rule the province. The mines of Honduras were valuable, but under Spanish government the colony developed slowly. In 1539 the province was made an audiencia of the Captaincy General of Guatemala. The laws enacted for the protection of the natives were systematically disregarded. In 1821 Honduras revolted from Spain and was annexed to the Mexican Empire. In 1823 it joined the federation of Central American states which was formed in October of that year and lasted until 1839, when it was finally dissolved. In 1849-51 Honduras formed a union with Salvador and Nicaragua, which ended in 1863 in war between the contracting parties. Between 1856 and 1860 the usual course of internal dissension was interrupted by the filibustering exploits of William Walker (q.v.). In 1871 war broke out between Honduras and Salvador and Guatemala, and after peace was declared, in 1874, a revolution in the interests of the ex-President, Medina, took place. Other states interfered, and the Guatemalan candidate, Soto, acted at first as provisional President and was elected to that office in April, 1877. In 1880 the national capital was removed from Comayagua to Tegucigalpa, and Soto was reelected President. In 1899 General Sierra was chosen President for the term ending in 1903. He was succeeded by Gen. Manuel Bonilla. In July, 1906, there was a sharp five days' war between Honduras and Salvador on one side and Guatemala on the other. (See GUATEMALA.) In 1910 there was a revolt under General Valladares, who seized

Amapala. The next year ex-President Bonilla led a revolt, and the United States intervened to secure an adjustment of the difficulties. President Miguel R. Dávila resigned, and General Bonilla was elected for another term, assuming office Feb. 1, 1912. Disturbed conditions continued, and in 1913 United States marines were landed to protect American property. President Bonilla died on March 31, 1913, and was succeeded by the Vice President Francisco Bertrand.

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HONDURAS, BAY OF. An inlet of the Caribbean Sea, between British Honduras, Guatemala, and Honduras. It forms several inlets, receives Belize and Motagua rivers, and contains the island of Turneffe and the Bay Islands, off the coast of Honduras.

HONDURAS, BRITISH. See BRITISH HONDURAS.

HONE, PHILIP (1780-1851). An American merchant and politician, born in New York City, where, with his brother, he built up a profitable business as an auctioneer. In 1816 he established the first savings bank in New York, was mayor of the city in 1826, and founded the Mercantile Library Association. He had been a Federalist, joined in the formation of the Whig party, and, it is said, gave it that name. He was prominent in national politics, opposed Jackson, and later condemned abolition. He wrote a diary for the years 1828 to 1851, which, edited in part by Tuckerman (1889), gives valuable impressions of life in New York and of the early days of the Whig party.

HONE, WILLIAM (1780-1842). An English author and bookseller, born at Bath. He was brought up in the strictest piety, even learning to read and write from the Bible. When 10 years old, he was apprenticed to a London attorney, but afterward set up as bookseller. He gained a contemporary notoriety by his satires on the government, which were illustrated by Cruikshank. For his parodies on the Prayer Book in his *Political Litany* (1817) he was prosecuted, but acquitted. His *Political House that Jack Built* (1819) ran through 54 editions.

Withdrawing from politics, he produced works of more permanent value, as. *Ancient Mysteries* (1823), a new edition of Strutt's *Sports and Pastimes* (1830); *Every Day Book* (1826-27), *Table Talk* (1827-28), *The Year Book* (1832), and many cheap and popular reprints. During his last years he frequently preached. He died at Tottenham. Some of the most characteristic of Hone's works have been reprinted by W. Tegg. *Every Day Book*, *Table Talk*, and *Year Book* (1873), and *The Three Trials*, an account of his prosecution by the government (1876). Consult *Early Life and Conversion of William Hone*, by Himself, edited by his son (London, 1841).

HONES (AS *hân*, Icel *hein*, stone, ultimately connected with Lat *cuneus*, Gk. *kónos*, *kónos*, wedge, Skt *sûna*, whetstone, from *sû*, *sî*, to sharpen), or **WHETSTONES**. A particular class of stones used for the purpose of sharpening edge tools, such as razors, knives, scythes, etc. They are usually cut into pieces of convenient size according to their intended uses. The finest kind of hones are those called oil-stones, these are hard, compact, and so very siliceous that they readily wear down the hardest steel, they are varieties of slate, derived from the argillaceous schists of the Paleozoic period. These stones are found in Turkey, Bohemia, Persia, in the Harz Mountains, in Styria, in the United States, Spain, Peru, and in Siberia. In Great Britain several localities yield hone stones of excellent quality, and none better than the celebrated Water-of-Ayr stone, which is much used for polishing copper plates as well as for hones. The hones used for sharpening scythes, etc., are usually made of coarse-grained sandstone. One of the best American stones for hones comes from Arkansas. In addition, there are artificial stones formed from abrasive materials, which possess advantages for certain purposes. See **ABRASIVES**.

HONESDALE. A borough and the county seat of Wayne Co., Pa., on the Lackawaxen River, 44 miles by rail northeast of Scranton, on the Delaware and Hudson and the Erie railroads (Map Pennsylvania, L 3). It has several public parks. Honesdale has extensive cut-glass manufactories. It manufactures also boots and shoes, silk and woolen goods, axes, foundry products, elevators, flour, paints, concrete blocks, etc. Pop., 1900, 2864, 1910, 2945.

HONEST GEORGE. A nickname given to George Monck, first Lord Albemarle.

HONEST MAN'S FORTUNE, THE. A play by Fletcher and Massinger and possibly others, performed in 1613 and printed in 1747.

HONEST MAN'S REVENGE, THE. See **ATHEIST'S TRAGEDY, THE**.

HONEST WHORE, THE. A play in two parts by Dekker, and perhaps Middleton, the first part of which was published in 1604. The earliest extant edition of the second part was not printed until 1630.

HONEY (AS *humg*, OHG. *honag*, *honang*, Ger *Honig*, of uncertain origin). A thick, sweet liquid, of more or less pronounced flavor, produced by bees of various kinds and by other insects. The neuter or working bees gather the nectar from the nectaries of flowers (and other sweet substances if flowers are lacking), extracting it by means of the proboscis and passing it into the crop or honey bag. The bee disgorges the honey into the cells of the comb. Apparently the sweet substance undergoes some change

in the honey bag, as honey differs in flavor from the nectar of the flowers from which it is gathered. The consistency of honey varies with age and is influenced by its source, that from some flowers being much thicker than that from others. The flavor also varies with the source from which it is gathered—that from clover, sweet clover, basswood, or linden flowers, e.g., being very agreeable, that from buckwheat is darker colored and less liked by some. Age also affects the flavor. Some honey which at first has a weedy taste loses this on keeping.

Honey has, on an average, the following percentage composition: carbohydrates, 81.2, water, 18.2, protein, 0.4, and ash, 0.2. The carbohydrates are made up of dextrose and levulose in about equal proportion. Honey sometimes contains a little wax and some aromatic bodies, which give it flavor. The best and newest honey is clear and contained in a white comb. Older honey is of a yellowish tone and sometimes darker. On standing, dextrose sometimes crystallizes out from liquid honey and renders it opaque or often thick. The composition of honey varies somewhat according to the food of the bees, their age, season, etc. It is a favorite article of diet, owing to its sweet taste and agreeable flavor. The actual food value depends upon the sugars (carbohydrates) present. Like all other carbohydrate foods, it is a source of energy. Honey has a fairly high fuel value, on an average—1520 calories per pound. It is, however, generally eaten for its flavor rather than for its true food value. To the ancients, who were unacquainted with sugar, it was very important, being used in ways as sugar is now. Taken in moderate quantity, honey is wholesome and laxative. Persons suffering from digestive disorders often find that it aggravates their symptoms, and there are persons in health who, owing to some idiosyncrasy, cannot eat honey without distress. Its therapeutic action is probably not very great, but it is frequently employed in mixtures prescribed for allaying coughs and in various agreeable cooling drinks used in febrile and inflammatory affections. It finds many uses in cookery, particularly in making cakes and confectionery. Some sorts, as certain German Christmas cakes and honey cakes, are very popular. It should be mentioned that honey occasionally possesses poisonous properties, due to the flowers from which it was gathered. The poisonous honey of Trebizond is gathered from *Azalea pontica*. In America poisoning has occurred from eating honey gathered from laurel (*Kalmia latifolia* and *Kalmia angustifolia*). Many other instances of poison honey are on record.

Honey is marketed in the comb and also extracted from it. The latter, sometimes called "strained" honey, was formerly often adulterated with commercial glucose. Since pure-food legislation was enacted, both national and State adulteration of honey has become uncommon in the United States. See also **BEE**.

HONEY BADGER. See **BADGER**.

HONEY BEAR (so called from its fondness for honey). The sloth bear of India (*Melursus labiatus*). One of the native names is aswail. See **BEAR**.

HONEY BEE. See **BEE**, **BEE KEEPING**.

HONEY BERRY. See **MELICOCOA**.

HONEY BUZZARD, or **PERN**. A large hawk of the genus *Fernus*, peculiar in having the lores closely covered with feathers, which over-

lap one another like scales. The food of honey buzzards consists, not of honey, but chiefly of bees, wasps, and their young, in quest of which these birds dig up the ground to get at the nests of the insects. They feed also partly on other insects and less frequently on lizards, small birds, and the like. The several species are natives of the Old World.

HONEYCOMB (AS *hunicamb*, from *hunig*, honey + *camb*, connected with *comb*, OHG *kamb*, *champ*, Ger *Kamm*, *comb*, Gk *γόμφος*, *gomphos*, OChurch Slav *zambŭ*, Skt *jambhya*, tooth). 1. See BEE, HONEY. 2. In a gun, a pitting of the exposed surfaces of the bore due to the corroding or rusting action of the residuum from smokeless powder. It results in inaccuracy and finally in unserviceability unless great care is taken to clean the gun after each day's use. The word is sometimes used for what is more properly called *erosion*, which is the mechanical removal of the superheated exposed surface of the bore effected by the frictional action of the gases of explosion under enormous pressure and with great velocities. No permanent cure for *erosion* has been devised. The modern gun on this account has a very limited life unless relined with a new bore, a remedy sometimes resorted to.

HONEY CREEPER. A bird of the family Cœrebidæ, a passerine family of tropical and subtropical America, especially abundant in the West Indies. They are small birds, 4 or 5 inches in length, but usually of very handsome plumage. The colors are frequently brilliant, blue being especially common. The bill is very slender, sharp, and often decurved, and the tongue is deeply bifid and penicillate. The honey creepers are very closely allied to the American warblers, of the family Mniotiltidæ, so common throughout the United States. About 40 species are known, one of which, the banana quit, has occasionally strayed to Florida. They probe the corollas of flowers for the minute insects contained therein, possibly also eating honey, and often hover before them like humming birds, which some of them hardly exceed in size or fall below in brilliance. Consult Gosse, *Birds of Jamaica* (London, 1847), and *A Naturalist's Sojourn in Jamaica* (ib, 1851).

HONEYDEW. A term applied to the sweetish secretion which under certain conditions drips from the leaves of some trees. It is a form of "bleeding" which appears only when an abundant supply of atmospheric moisture (reducing evaporation) and a high temperature permit the development of a considerable sap pressure in the live cells. Some kinds of manna are the dried honeydew or the saccharine exudations of certain plants. Very generally this exudation, as it dries, coats the surface of leaves and branches with a clammy film to which everything brought by the atmosphere adheres, thus closing the pores of the plant and impairing its health.

The name "honeydew" is often applied to a saccharine secretion of certain insects, notably the plant lice, the flea lice (Psyllidæ), certain scale insects and white flies (Aleyrodidæ), and certain leaf hoppers or tree hoppers. Of the latter, *Proconia* (*Oncometopia*) *undata* secretes the most abundant supply and is the cause of the phenomenon often described as "weeping trees." The honeydew secreted by all of these insects is frequently very abundant, giving the foliage and bark of trees a glistening appearance and fre-

quently attracting swarms of bees, ants, wasps, and other honey-loving insects. Sometimes, when very abundant, as when sugar cane is attacked by leaf hoppers, bees collect the honey dew to such an extent as to impair the quality of the honey. Honeydew affords a welcome nidus for the spores of certain of the smut fungi, and an affected tree is likely soon to become black with smut. Thus, an olive orchard in California or southern Europe, the leaves of which turn black, will almost always be found to be infested with a scale insect (*Lecanium oleæ*) which secretes a quantity of honeydew. Orange and lemon plantations sometimes suffer great injury from the abundance of honeydew. See APHID.

HONEY EATER, or **HONEY SUCKER**. A name sometimes given to some of the Oriental sunbirds (q v), but also the common name of a large family of birds nearly allied to these and peculiar to Australia and the islands of that part of the world. This family, Meliphagidæ, of the order Passeres, has a long curved sharp bill (see Plate of CREEPERS), not so slender as in humming birds and sunbirds, the tongue terminates in a pencil of delicate filaments the better to adapt it for sucking honey from flowers or juices from fruits. These are a part of the food of the honey eaters, but they also devour insects in great numbers. They are birds of elegant form and generally of gay plumage. Most of them have a long and broad tail. They are vivacious and active and keep up a continual chattering. Over 200 species of this family are known, arranged in about 25 genera. Examples are elsewhere described under BELL BIRD, BLOOD-BIRD, PARSON BIRD, ETC. Cf FLOWER PECKERS and see POLLINATION.

HONEY GUIDE, **INDICATOR**, or **MOROC**. The popular name of a family of birds ranked in the vicinity of the barbet (q v) and the woodpecker (q v), but differing from these families in characters which show a slight approach to cuckoos, and also, in some respects, to creepers. About a dozen species are known, mostly natives of Africa, and found in almost all parts of it, but one species occurs in India, one in Malacca, and one in Borneo. They have acquired their name from guiding men to honey, a curious instinct prompting them to flutter near the traveler with frequent repetitions of a cry which resembles the syllable *cherr*, and it is said that if followed they almost always lead to a place where a bees' nest may be found. This story has been denounced as fabulous, but reliable observers vouch for its truthfulness. The birds are very fond of honey and always reap a harvest after man has once opened up a bee tree and taken what honey he wants. It is said that the Kaffirs never fail to leave a generous meal for the bird which has guided them to the tree. The honey guides are small birds of dull plumage and rather stout bill. They generally build pensile nests and lay white eggs; but some species are said to lay their eggs in the nests of other birds, as the European cuckoo and the cowbird do. See Plate of TROGON, HOOPOE, ETC.

HONEY LOCUST, *Gleditsia triacanthos*, also known as sweet locust and black locust, and in Great Britain as three-thorned acacia. A lofty and beautiful tree of the family Leguminosæ, a native of the rich valleys from Ontario through the basin of the Mississippi. It is not found wild on the Atlantic coast of North America, although often planted in parks and in the

vicinity of habitations. The flowers are small, greenish, and in spikes. The leaves are twice pinnate, without terminal leaflets, and derive a peculiar gracefulness from the numerous small, light-green, shining leaflets. The tree is furnished with numerous sharp triple spines. The pods are long, flat, pendulous, often twisted, the seeds large, brown, and enveloped in a pulp, which, when the pod is ripe, is very sweet. Sugar has been made from it, and when fermented it yields an intoxicating beverage, formerly in use among the American Indians. The honey locust attains a height of 70 or 80 feet. The wood resembles that of the American locust tree (see ACACIA), but is more coarse-grained. A variety is common in which the trees are nearly without thorns. The honey locust is valuable for windbreaks, hedges, and other plantations. A second species, *Gleditsia aquatica*, called water locust, is found from Kentucky and Missouri to the Gulf region and along the Atlantic from South Carolina to Florida. A third species, *Gleditsia texana*, is a large tree in Texas, where it attains a height of more than 100 feet. See MESQUITE TREE.

HONEY-MAKING ANT. Any of several species of ants of the genus *Myrmecocystus*, inhabiting Colorado, Arizona, New Mexico, and Mexico. Like other ants, they live in colonies, in subterranean nests, the entrance to which is in a small raised mound. The honey is obtained at night from small galls on oak leaves by foraging workers which come home considerably distended with honey. With the honey they feed the other workers and the young in the hill, and what is left over is communicated to a number of ants which simply serve as living receptacles. These live honey bags cling to the roof of the nest chamber and move very little, and in time their abdomens become enormously distended. According to McCook, these living storehouses merely retain the honey until it is needed by the colony during the winter, when it is given out from the surcharged crops to feed the colony. Ants with similar habits, but of the genera *Melophorus* and *Camponotus*, have been described from Australia, and still another genus (*Plagiolepis*) has more recently been discovered in South Africa. In Mexico these ants are eaten by the natives. Consult McCook, *The Honey Ants of the Garden of the Gods*, etc. (Philadelphia, 1881), Comstock, in *Standard Natural History*, vol. 11 (Boston, 1884), Sharp, in *Cambridge Natural History*, vol. vi (New York and London, 1900); Wheeler, *Ants* (New York, 1910). See ANT.

HONEYMOON, THE. A comedy in five acts, by John Tobin. It was produced after the author's death in 1805.

HONEY MOTH. See BEE.

HONEY POD. See MESQUITE TREE.

HONEY STONE. See MELILITE.

HONEY SUCKER. A bird of the family Melphagidae, or some related form, as the diamond bird, an indefinite term for a somewhat indeterminate assemblage of Oriental and Australian birds. See BELL BIRD, HONEY EATER, MOHO.

HONEY-SUCK'LE (AS *humsuoc*, *humsuge*, from *huny*, honey + *sūcan*, *sūgan*, OHG *sūger*, Ger *saugen*, Lat *sugere*, to suck), *Lonicera*. A genus of plants of the family Caprifoliaceae. The species number 100 or more, all of which are indigenous in the Northern Hemisphere. They are shrubs, often twining, and have the

flowers either in whorls or in pairs. The calyx is short and five-toothed, the corolla, tubular-funnel-shaped, five-cleft, generally two-lipped; the fruit a three-celled and many-seeded berry. About half the species of *Lonicera*, as well as many hybrids, are in cultivation. The common honeysuckle, or woodbine, of England (*Lonicera periclymenum*) is very abundant in woods and thickets in most parts of Great Britain. On account of its beautiful cream-colored flowers and their delightful fragrance the honeysuckle is often planted in shrubberies. It is said to be the "twisted eglantine" of Milton. Very similar to this is the perfoliate honeysuckle (*Lonicera caprifolium*), with whorls of paler flowers, and remarkable for having the upper leaves united so that an opposite pair form one leaf, through the middle of which the stem passes. This peculiarity is confined to the flower-bearing shoots and does not occur in the young runners; it is also most perfect near the flower. This species is a native of the south of Europe and much planted, as, although less fragrant than the common honeysuckle, it flowers earlier. There are numerous other species, natives of Europe, Siberia, and North America. The fly honeysuckle (*Lonicera xylosteum*) is an erect shrub, a native of Europe and Asia, common in shrubberies. Its branches are not infrequently used in some parts of Europe for tubes of tobacco pipes, and it is said to make good hedges in dry soils. The trumpet honeysuckle (*Lonicera sempervirens*), a twining green shrub, called in America the coral honeysuckle, is a native of the southern United States, often planted on account of its beautiful scented flowers, red on the outside and scarlet within. The Japanese honeysuckle (*Lonicera japonica*) has become established in the eastern part of the United States, having escaped from cultivation. The berries of the honeysuckle are nauseous. The name "honeysuckle" is also given to shrubs very different from this genus, but of which the flowers abound in honey, as to species of *Banksia* in Australia, *Diervilla*, *Aquilegia*, etc., in the United States. *Rhododendron viscosum* is called swamp honeysuckle in North America.

HONEY-SUCKLE ORNAMENT. See ANTHEMION.

HONEY-SUCKLE TREE. See BANKSIA.

HONFLEUR, *on'flēr'*. A seaport town in the Department of Calvados, France, on the southern shore of the estuary of the Seine, 7 miles from Havre, which lies on the opposite shore (Map France, N, F 3). It has a fifteenth-century chapel, which contains J. Jordaens's famous painting, "Jesus in the Garden of Gethsemane." The town lost much of its former commercial importance, owing to the silting of its harbor and the proximity of Havre, but since 1860 a floating basin and other harbor improvements have been installed and have revived its waning commerce. There are thriving fishing industries and a considerable trade in cattle, butter, eggs, poultry, and grain is carried on. Considerable manufactures of rope, leather, metal goods, and chemicals have grown up. The United States is represented by a consular agent. Pop., 1901, 9610; 1911, 9298. Honfleur, founded in the eleventh century, was of considerable strategical importance during the wars between France and England.

HONG-KIANG, *hōng'-kyāng'*, or WEST RIVER. See SI-KIANG.

HONGKONG, *hōng'kōng'* (Chin., Fair Har-

bor) An island belonging to Great Britain, lying off the southeast coast of China, from which it is separated by a narrow channel (one-fourth mile at its narrowest), known as Ly-e-Mun (or Caipfish Pass), at the mouth of the Chu-kiang (or Pearl) River (Map China, K 7) It is 91 miles southeast of Canton and 40 miles east of Macao Consisting of a range of granitic hills, it has little level land, its coast line is very irregular, and its shores are steep and precipitous, but broken in many places, especially on the south coast, by deep inlets, the chief of which are Ty- (or Tai-) tam and Shek-pai Wan It is about 10 miles long from east to west and nearly 4 miles in average breadth Area, about 32 square miles The highest of six mountain peaks is Victoria Peak, with an elevation above sea level of 1825 feet

Geologically Hongkong is entirely of igneous origin, its prevailing rock being a gray, rapidly disintegrating syenite, upheaved and penetrated by porphyritic rocks and basaltic trap The climate of the island is very trying to foreigners The temperature seldom exceeds 93° F, the minimum summer temperature is 75° F, but the rainfall in certain seasons is sometimes excessive, which makes the humidity very high The driest month is December, and winter generally is the most delightful part of the year The sanitary arrangements are good, but the Chinese quarter is sometimes visited by epidemics

Notwithstanding the rocky character of the island and its generally barren appearance, Hongkong possesses a rich and varied flora Bentham, in his *Flora Hongkongensis* (London, 1861), enumerates 1066 species of flowering plants and ferns, divided into 591 genera and 125 orders The fauna of the island includes a few species of kingfisher, some singing birds and rock pigeons, several varieties of snakes and lizards are found, and scorpions and centipedes abound Insect life is more plentiful and includes the mosquito and a flying cockroach from 1 inch to 1½ or 2 inches long Ants, both white and red, are abundant and destructive

The census of May, 1911, gave the population of the British colony of Hongkong (ie, including the New Territories, on the mainland) as 456,739, of which 12,075 were non-Chinese and 444,664 Chinese The Chinese boat population numbered 54,083 The city of Victoria, capital of the colony, had 7825 non-Chinese and 216,022 Chinese residents The Peak population, on the high hill rising above Victoria, numbered 723 and 1749 respectively The inhabitants of the New Territories (Kowloon Extension), on the mainland, were reported at 90,594 Chinese. Of the islands around Hongkong under British jurisdiction, Lantau had 7940, Chengchow 2734, and Lamma 1134 Chinese inhabitants, mainly agriculturists and fishermen A considerable number of Chinese come and go to and from Hongkong, in 1912 this emigration numbered 122,657, and the immigration 163,248 In the same year 4461 Chinese left Hongkong for the United States, and 6757 returned

The harbor of Hongkong, characterized by H B Morse as "one of the few harbors in the world which may be called perfect" has an area of 10 square miles The only danger lies in occasional typhoons, which were destructive in 1906 and 1908 Extensive reclamation has been undertaken, consisting up to 1903 of 65 acres at a cost of \$3,362,325 (Hongkong currency) On this reclaimed ground stand some

of the finest buildings of the colony The numerous dock accommodations are excellent, safe, and well sheltered A new dock was added in 1908, the largest in the Empire outside of England, with a length of 787 feet, a width of 77½ feet at the bottom, 88 feet wide at the top, and a depth of 31 feet at low-water spring tides It can be filled in 45 minutes and pumped out in 2 hours, 40 minutes It is built of cement concrete lined with granite, on solid rock bottom, and can be enlarged

Hongkong was declared a free port in 1842 and has remained one ever since, except for a tax on opium and intoxicating liquor It is the distributing port of the world for south China, as Shanghai is for the north The colony publishes no statistics of trade or reexports, excepting shipping In 1912 there were 488,649 vessels, of 36,735,149 tons, which entered the harbor and cleared. Foreign ocean-going vessels showed an increase over 1911 of 187, of 674,680 tons British ships and commerce led among the nations, with Japan second and Germany third Exports from the United Kingdom to Hongkong in 1913 totaled £4,358,902, and imports £676,293 Exports of the United States to Hongkong were, in the fiscal year 1914, \$10,696,214, and imports therefrom \$3,085,840 The exports from the United States to Hongkong include flour, mineral oil, and cotton goods Hongkong's exports consist mainly of rice, tea, tin, silk, cassia, sugar, preserved ginger, drugs, and feathers, and imports of cotton yarn and goods, kerosene, machinery, coal, flour, woollens, cutlery, ginseng, tobacco, and opium For trade purposes the Mexican and Hongkong dollar are legal tender In 1912 the Hongkong dollar was equal to 2 shillings

There is little agriculture done in the colony The Chinese ply such industries as fishing, boat making, glass blowing, opium boiling, the manufacture of soap, dyes, and tooth powder, wood and ivory carving, goldbeating, and the production of gold, silver, copper, iron, and sandalwood wares Hongkong is a flourishing industrial centre There are three large sugar refineries, a brewery, ice, match, soap, lard, rope, and cigar factories, flour mills, cement works, gas and electric companies, engineering works, cotton spinning and paper mills, etc, also the manufacture of drainpipes, tiles, blackwood furniture, bamboo and rattan ware Granite quarrying is an important industry, and large quantities of dressed stone are exported The prosperity of the colony is best shown by the prices demanded and received for choice harbor fronts, which bring twice the prices of similar locations in Brooklyn or Jersey City

The average strength of the military force is 4500, of the navy 2500 men In addition there is a Volunteer Reserve Association of British residents over 25 years of age Regiments stationed at Hongkong consist mainly of Indian (Sikh) troops, although from time to time famous regiments of the British army are in garrison The harbor is well fortified, all commanding approaches being mounted with the latest type of guns. A small naval squadron is maintained Hongkong is also the naval base for the British warships of the China station

In 1912 the revenue amounted to \$3,180,694 (Hongkong currency), and expenditures to \$7,202,543 To the military expenses Hongkong contributed \$1,421,352, the highest pro rata of any part of the Empire The ratable value of

the city of Victoria in 1911-12 was \$9,006,553, and the assessment for the entire colony amounted to \$11,161,390. December 31, 1912, the assets of Hongkong exceeded the liabilities by \$2,805,129 (£280,513). The public debt, Jan 1, 1912, amounted to £1,485,732. Public revenue is derived mainly from land taxes and land sales, licenses, court fees, the post offices, rent of government property, light and harbor dues, opium, etc. Important items of expenditure are public works, the military, police, sanitation, and the section in British territory of the Hongkong-Canton Railway, begun in 1907 and opened 1910, with a branch line completed in 1912.

Hongkong is a crown colony, administered by a governor assisted by an executive council of eight and a legislative council of 14, which are composed of leading government officials, with the exception of six unofficial members of the Legislative Council, two of whom are always Chinese.

There are about 75 schools under government supervision or aid with 6333 students, and 312 unaided schools, with 9764 pupils. A Technical School was started in 1906 and has 421 students. The University of Hongkong was opened in 1912, and in 1917 the Hongkong College of Medicine will be incorporated with it. The patron is the King of England, and the chancellor the Governor. The university offers courses in arts, medicine, and engineering, including instruction in Chinese and public health. It is modeled on the plan of the University of London and started with 76 students. Queen's College numbers 555 boys, mainly Chinese. Hongkong has four daily English newspapers, five weekly, including the *Government Gazette*, eight Chinese publications, one Japanese, and an annual.

The great bulk of the population is found in the city of Victoria (called by the Chinese Kwanton), which extends for nearly 4 miles along the north shore, opposite the rocky peninsula of Kowloon, about 1½ miles distant. There are the government buildings and the great business houses and warehouses, stretching along the water front or perched in terrace-like rows on the steep hillsides. The city is well built, and its roads and streets, lighted with gas and electricity are kept in good repair. There are many trees, and the authorities are actively engaged in reforestation. The European quarter is in the middle of the city, with the Chinese densely populating the lower and western parts. Notable buildings are the Government House, the city hall, built in 1866-69 by subscription and containing a fine theatre, library, and museum, the post office, the courts of justice, supposed to be the most substantial building in Asia, and the clock tower, erected in 1862. There are also a fine botanic garden, a large parade ground, and several good hotels. Two Chinese theatres give native performances. Many statues adorn the prominent points. One of the numerous hospitals was the gift of Madame Wu Ting Fang. Over a dozen churches are found, some of them very beautiful buildings, also two Mohammedan mosques, a Sikh temple, and a Jewish synagogue. The Hongkong Chamber of Commerce meets annually, and its advice is often asked by the government on matters of trade. Among clubs the principal ones are the Hongkong, Germania, Lusitano, and Nippon. There are a Philharmonic Society, a Dramatic Club, and also golf, football, polo, cricket, hockey, and two yacht clubs. The Hongkong races form the great

society and sporting event of south China. The Peak district, high up on the hill, abounds with pretty bungalows and residences, and has also a club, church, hospital, public garden, and military sanatorium. Near the summit is the summer house of the Governor. An inclined plane and steam tramway, of the wire-rope system, goes two-thirds of the way to the top, while a well-made road runs to the summit. Besides the tramway the methods of conveyance in Victoria are by jinrikishas and sedan chairs. There is an electric tramway of 9¼ miles in length running from the capital. Of other towns on the island, the most important is Aberdeen, which has a good harbor and two docks.

The New Territories (Kowloon Extension) is on the mainland. Yaumatei is the principal village, with considerable junk trade, also gas works and water works. Three regiments of Indian infantry are stationed at Tsimtsatsui, where they have a mosque. There are also fine godowns, wharves, many churches, schools, hotels, a building yard, docks and works, a brewery, and a cigar factory. Much reclamation work has been done. The city of Kowloon remains under Chinese jurisdiction by treaty agreement.

Hongkong was ceded to the British in 1842 by the Treaty of Nanking. June 26, 1843, it became by proclamation a separate colony, but was governed by the Minister Plenipotentiary to China until 1857. Four square miles of the mainland were first leased and then ceded in perpetuity by the Peking Convention in 1860. In 1898 China ceded the territory behind Kowloon peninsula on a lease of 99 years, consisting of 376 square miles—286 square miles of mainland, 90 square miles of neighboring islands. Possession was taken by the British in 1899. Consult Mayer and Dennis, *Treaty Ports of China and Japan* (London, 1867), E. J. Eitel, *Europe in China. The History of Hongkong* (ib, 1895), Norman, *The Far East* (ib, 1898), James Cantlie, *Hong Kong*, in the "British Empire Series," vol 1 (ib, 1899), W. E. Curtis, *Egypt, Burma, and British Malaysia* (New York, 1905), J. S. Thomson, *The Chinese* (Indianapolis, 1909).

HONI SOIT QUI MAL Y PENSE, ō'nē swa kē mal ē pans (Fr., Evil to him who evil thinks). An exclamation popularly believed to have been uttered by Edward III at a ball when he tied about his leg a garter which the Countess of Salisbury had dropped while dancing. The words form the motto of the Order of the Garter (q.v.).

HONITON. See LACE.

HONITON, hōn'i-ton. A market town and municipal borough in Devonshire, England, on the Otter, 16 miles northeast of Exeter (Map England, C 6). It is famous as the original manufacturing seat of "Honiton lace," and it now has a school for lace makers. The manufacture was introduced by the Lollards during the reign of Elizabeth. There are also produced bricks, tile, pottery, and iron. Pop, 1901, 3271, 1911, 3191.

HONNECOURT, WILARS DE. See WILARS DE HONNECOURT.

HONOBERTUS. See CUNIBERT, SAINT.

HONOLULU, hōn'ō-lō'ō. The capital and commercial centre of the Hawaiian Islands, situated on the south coast of the island of Oahu, in lat. 21° 18' N, and long 157° 55' W, 2089 miles southwest of San Francisco (Map Hawaii, D 2). It is wholly modern, surrounded by lux-

urnut fruit and ornamental trees and foliage, and is famed for its beauty and the loveliness of the region. It has a very healthful and mild climate, especially favorable for pulmonary troubles. The streets are well laid out, and the houses, although unpretentious, are rendered picturesque by gardens. Honolulu has about 37 miles of macadam streets. The area of its public parks is 194 acres. Among the public buildings are the royal palace, completed in the Italian style in 1882, the government buildings, several churches, a museum containing interesting remains relating to the early history of the archipelago, a theatre, and a bank. There are 32 public schools and one high school, with 233 teachers and a total attendance of 5363 pupils in 1914. Oahu College had, in 1913, 743 students and 22 teachers. Honolulu has several hospitals and a public library. There are manufactures of machinery, pineapple canneries, and a factory for transforming the algaroba bean into stock food. The town is equipped with a good water supply, electric lighting and railway and telephone service. Its water-works plant, costing \$1,300,000, and its electric-light plant are owned and operated by the Territorial government. The harbor is well protected by coral reefs. The light from its lighthouse is visible 8 leagues. The number of ships entered and cleared in the fiscal year 1913 was 835, with a tonnage of 3,004,000. Honolulu has regular steam communication with San Francisco (with which it is also connected by cable), Seattle, Vancouver, New Zealand, Sydney, and Japan. It has also wireless communication with the coast of the United States and with the principal islands of the Hawaiian group and is an important relay station in the transpacific cable system. It forms the chief outlet for the trade of the entire archipelago. It is the seat of an Anglican and of a Roman Catholic bishop and of a number of European consular agents as well as of the government officials of the islands. As late as 1815 the present capital was a mere village. In that year, at the suggestion of John Young, an Englishman, then Governor of Hawaii, it was fortified, and in 1820 it became the capital of the archipelago. Pop. 1900, 39,306, 1910, 52,183 and estimated at 60,000 in 1914. The 1910 population included 9674 Chinese, 12,093 Japanese, 6147 Portuguese, 7910 Hawaiians, 4233 Caucasian-Hawaiians, and other Caucasians, 9200. The ocean distances from Honolulu are, to San Francisco 2100 miles, to Panama 4720, to Manila 4890, to Yokohama 3400, to Sydney (Australia) 4410, to Hongkong 4920.

HONOR. In English feudal land law, an estate or lordship made up of two or more manors held by one person of the king or of some mesne lord. The several manors comprised in the honor might in their turn be held by separate tenants of the lord of the honor. Where this was the case each manor retained its independent jurisdiction, exercised through its court baron, but where the manors were not separately held, one court baron was often, though not invariably, held for the entire honor. In this case, however, the court was regarded as the court baron of each manor and administered for each its own customary law, however this might differ from the law of the other manors. See **BARONY**, **COURT BARON**, **LORDSHIP**; **MANOR**, and, generally, **FEUDALISM**.

HONOR, COURT OF. A fraternal insurance

society founded in 1895. Its objects are to furnish life indemnity to its members to encourage them in business and to promote benevolence and charity. It is governed by a body of elected delegates, one for each 500 benefit members. In 1914 the society had 1204 courts, with about 75,000 members chiefly in the North Central States. Since its organization the society has disbursed in death and disability claims nearly \$10,000,000.

HONOR, KNIGHTS AND LADIES OF. See **KNIGHTS AND LADIES OF HONOR**.

HONOR, KNIGHTS OF. See **KNIGHTS OF HONOR**.

HONOR, LEGION OF. See **LEGION OF HONOR**.

HONOR, MAIDS OF. See **HOLSEHOID, ROYAL**.

HONOR, MEDAL OF (UNITED STATES). See **MEDAL OF HONOR**.

HONOR, TITLES OF. See **TITLES OF HONOR**.

HONORIA, JUSTA GRAIA. A daughter of Constantius III and sister to Valentinian III, born about 418 AD in Constantinople. Living at Valentinian's court in Rome, she secretly invited, it is said, Attila the Hun to marry her, but as he did not entertain the proposition, she sent another invitation, and Attila, accepting it, claimed with her a portion of the Empire. As Valentinian refused to accede to such a demand, Attila invaded Gaul. Honoria's fate is unknown. For a criticism of this story, consult the *Cambridge Medieval History*, vol. 1 (New York, 1911).

HONORIUS. The name of four popes and one antipope—**HONORIUS I**, Pope 625-638. He was born of a consular family in Campania. Of his early history little is known, except that he took an active part in bringing to a close the disputes which arose in northern Italy about the controversy of the three chapters (See **VIGILIUS**). As Pope, his name is connected with the history of the paschal controversy in Ireland and with that of the early Anglo-Saxon church, and his pontificate is particularly memorable on account of the Monothelite heresy. (See **MONOTHELITISM**.) Honorius, misled, it is alleged, by a letter of Sergius, Patriarch of Constantinople, replied that the terms in controversy should not be used and even appeared to condemn the doctrine of two wills of Christ. In a decree of the sixth general council (Constantinople, 680-681) Honorius is anathematized in company with Sergius and others, of whose heterodoxy there can be no doubt. Catholic theologians, however, defend his orthodoxy, or point out that his case is not one of those in which infallibility is claimed by the Vatican decree, or that he was not Monothelite, but only sanctioned the suppression of orthodox as well as heterodox terms for the sake of peace. It was because Dollinger (qv) believed that the heresy of Honorius was irrefutably established that he could not conscientiously accept the dogma of papal infallibility, because it was retroactive and implied that there never had been a pope who was heretical. This assertion in regard to Honorius was an important factor in the Old Catholic movement. He died in 638. The controversy in the Vatican council produced an extensive literature. Consult Pennacchi, *De Honorii Causa in Concilio Serto* (Rome, 1870), Hefele, *Causa Honorii Papae* (Naples, 1870), a defense presented to the Vatican council, Willis, *Pope Honorius and the New Roman Dogma* (London, 1879), Dollinger, *Fables and Prophecies of the Middle Ages* (New

York, 1892). Mann, *The Popes in the Early Middle Ages*, vol 1 (London, 1902). Chevalier, *Repertoire des sources historiques, Bio-bibliographie s v Honorius I* (Paris, 1905). F A Gasquet, *Henry III and the Church* (London, 1905). The letters of Honorius are in Migne, *Patrologia Latina*, lxx—HONORIUS II (Lambert, Cardinal of Ostia) Pope 1124-30. He recognized Lothair of Saxony as German Emperor (see LOTHAIR III) and was unable to crush the growing power of Count Roger of Sicily in south Italy (See ROGER II). His letters are in Migne, *Patrologia Latina*, clxvi.—HONORIUS II was also the title taken by Peter Cadalous, Bishop of Parma, antipope to Alexander II, 1061. He died 1073. Consult Hauck, *Realencyclopädie*, vol viii (Leipzig, 1900).—HONORIUS III (Cencio Savelli) Pope 1216-27. He crowned Frederick II as Emperor, tried in vain to institute a crusade, and confirmed the orders of the Dominicans and Franciscans. To him we owe the famous *Liber Censusum Romanæ Ecclesiæ*, in which the income of the Church of his day is detailed. It was reprinted by Paul Fabre, *Liber Censusum* (Paris, fasc 1, 1889, fasc 2-5, 1901-04). Consult Tauge, *Die päpstlichen Kanceliordnungen von 1200-1500* (Innsbruck, 1894). His works are in Hooy, *Mémoires de la Bibliothèque Patristica* (Paris, 1879-82). Consult *Regesta*, edited by P. Pressutti (Rome, 1888-95), and, for his life, Clausen (Bonn, 1895). Knebel (Münster, 1905).—HONORIUS IV (Giacomo Savelli) Pope 1285-87. He was born in 1210 and notwithstanding his years when called to the papal see, was very energetic. Consult his life by Pawheki (Münster, 1896), and F. Gregorovius, *Rome in the Middle Ages*, vol v (London, 1900-02).

HONORIUS, FLAVIUS (384-423 A.D.) Roman Emperor of the West from 395 to 423, second son of Theodosius the Great. When, on the death of his father, 395 A.D., the Empire was divided into two parts, Honorius received the western half, with Rome as his capital, while his brother Arcadius received the eastern half, with Constantinople as his capital. Honorius was put under the guardianship of Stilicho (qv), who was for 13 years the de facto ruler of the Western Empire. Honorius at first took up his residence at Milan, later for the most part he held his court at Ravenna. In 398 he married Maria, the daughter of Stilicho. In 401 Alaric (qv), King of the Visigoths, invaded Italy. Stilicho, who was then in Germany, marched against him, and a great battle was fought at Pollentia in 403 (or 402), followed by another encounter at Verona (403). Alaric, unable to withstand Stilicho, withdrew from Italy. Another irruption of barbarians, under Radagaisus, took place in 405, which was again repelled by Stilicho, who nevertheless lost the favor of his master and was treacherously slain at Ravenna, 408 A.D. Alaric, quick to take advantage of the opportunity afforded him, invaded Italy in 408 and besieged Rome, which escaped only on the payment of a heavy ransom, and in the following year he again besieged and took it, raising Attalus to the Imperial purple as a rival to Honorius, but a little later deposing him. In 410 the Visigothic King again appeared before Rome and handed it over to be pillaged by his troops. The death of the invader in the same year again freed Italy. A new champion of the falling Empire arose in the

person of Constantius, who suppressed the rebellions of Constantine, Jovinus, and Sallustius in the northern provinces and of Heracian in Africa. He was now appointed the colleague of Honorius in the consulship and received in marriage the hand of Placidia, sister of Honorius, along with a share in the Empire (417), which he did not long enjoy, as his death took place a few months after. The Gothic and German tribes had for some time been slowly but steadily encroaching upon the Western Empire, and in the reign of Honorius, a feeble ruler, Spain, Gaul, and Pannonia, some of the finest provinces, were snatched from its grasp. In support of the Church, however, and in persecution of the heathen Honorius showed much energy. He died Aug 27, 423. Consult Bay, *Later Roman Empire* (London, 1889), and the *Cambridge Medieval History*, vol 1 (New York, 1911).

HONORS, MILITARY. The courtesies, salutes, and other ceremonies, granted as a matter of custom and regulations to civilian officials of the government, to military officers of high rank, to the national and regimental flags, to the national anthem, and to the official and military dead. These honors include playing the national anthem on ceremonial occasions, sounding "to the color" with field music or bugles, "dropping" the regimental colors or standards by way of salute, sounding "flourishes" on trumpets and "ruffles" on drums, hand salutes, salutes with cannon, visits of courtesy, escorts of honor, escort of the color, funeral escorts of honor, half-masting the flag in case of death or on Memorial Day, etc. See SALUTES.

HONORS OF WAR. Stipulated privileges allowed a capitulating enemy, formerly a chivalrous appreciation of his valor, but in later times dictated almost entirely by the political or economic phase of the question. Honors of war include the retention of arms or standards, the granting of parole, and the general treatment of the surrendered troops and stores.

HONSHU, hōn'shū. The most important of the group of islands constituting the Empire of Japan. See HONDO.

HONTAN, A L, BARON DE LA. See LA HONTAN.

HONTHEIM, hōnt'hīm, JOHANN NIKOLAUS VON (1701-90). A German Roman Catholic prelate and writer. He was born at Treves, Jan. 27, 1701. He was educated in the Jesuit school of his native city, studied canon law at Louvain under the celebrated Van Espen, and afterward taught at Treves and Coblenz. He wrote two voluminous works on the history of Treves, *Historia Trevirensis Diplomatica* (1750) and *Prodromus Historiæ Trevirensis* (1757), but his literary career is chiefly memorable for a theological essay, *De Statu Ecclesiæ et Legitima Potestate Romani Pontificis* (1763), which by the novelty and boldness of its views created an immense sensation in the theological world. The work was composed with a view to the reunion of Christian sects. The work was published under the pseudonym of Justinus Febronius (a name taken from that of Hontheim's niece, a canoness at Juvigny, who was called Justina Febronia), and the system of Church government which the work propounds has been called Febronianism (qv). The work, immediately after its appearance, was condemned by Clement XIII as well as by many individual bishops. It drew forth a number of replies, the most im-

portant of which are those of Zaccaria (1767) and Ballerini (1768) Pius VI, in 1778, required from Hontheim a retraction of these doctrines This retraction, however, was modified by a subsequent *Commentary*, published at Frankfurt in 1781, to which, at the desire of the Pope, Cardinal Gerold replied Hontheim made full submission to the Church in 1788 and died in his ninetieth year at Montquintin in Luxembourg, Sept 2, 1790 Consult Mejer, *Febionius* (Freiburg, 1885), a work biased in favor of Hontheim

HONTHORST, hōnt'hōrst, GERARD VAN (1590-1656) A Dutch portrait, genre, allegorical, and historical painter, born at Utrecht He was a pupil of Abraham Bloemaert At 20 he went to Italy and was greatly influenced by Caravaggio, it was there that he gained the sobriquet Gherardo della Notte, from his frequent painting of night scenes When he returned to Utrecht, he was made the head of the Guild of St. Luke (1623) and opened a large school An invitation from Charles I took him to England in 1628 There he decorated Whitehall with allegorical pictures and painted portraits of the royal family and of many of the English nobility On his return to Holland he decorated the palace of The Hague In the National Portrait Gallery, London, are portraits by him of the Duke of Buckingham, the Earl of Craven, the Queen of Bohemia, James Harrington, Ben Jonson, at Hampton Court, a picture of the King and Queen of Bohemia enthroned in the clouds as Apollo and Diana, with the Duke of Buckingham as Mercury (for this Honthorst received 3000 gulden, a silver service for 12 persons, and a horse). His historical and religious pictures are unimportant, and his portraits, though excellent as likenesses, sometimes lack ideality

HONVÉD, hōn'vād (Hung, land defenders) The name given in Hungary under the earlier kings to the national champions With the disappearance of these the word, too, disappeared, but in the summer of 1848 it was revived and applied first to those Hungarian volunteers dispatched to the south against the Serbs and subsequently, when the war with Austria commenced, to the whole patriotic army Since the reconstruction of the Austro-Hungarian monarchy the name "honved," or "honvédség," has been given to the militia of the Hungarian portion of the Empire In 1893 a monument was erected in their memory at Budapest See AUSTRIA-HUNGARY, *Army*

HOOBLY, hōb'blī A town in the Province of Bombay, British India See HUBLI

HOÛCH, hōg, or **HOOGH**, PIETER DE (1629-after 1677). One of the principal Dutch genre painters Recent research has shown that he was born at Rotterdam in December, 1629, not at Utrecht in 1632, as was formerly supposed According to Houbraken (qv) he was a pupil of Nicolaes Berchem; his early work, however, does not resemble this supposed master's, but rather the art of the painters of Delft and Leyden In 1653 he is mentioned as "painter and footman," in the service of Justus de la Grange, a rich merchant, with whom he lived at Delft, Leyden, and The Hague Leaving his service, the artist was married in 1654 to a girl of Delft, in which city he is recorded as member of the painters' guild in 1655 From his dated pictures showing views of Delft, we know that he probably lived there till 1665 This is the

period of his best works, painted in rivalry with Jan Vermeer The two artists were closely associated and mutually influenced each other to such an extent that their works have been sometimes confused Both are essentially painters of strong light effects, usually in interior scenes, but De Hooch usually adds the vista of a second room, brightly illuminated His colors are warmer, including a strong red, like that of Nicolaes Maes, and he uses more figures than does Vermeer in his compositions representing scenes from the home life of the middle class After his removal to Amsterdam, where his presence is recorded in 1668, his art declined He became a fashionable painter of high society in large and magnificent salons, with a superficial execution and exaggerated light effects His last-known work is dated 1677, soon after which he died Owing to the variety as well as the excellence of his works, they bring the very highest prices The Rijks-Museum, Amsterdam, has six, including the well-known "The Pantry," "Maternal Tasks," and "County House", the Berlin Museum four, including "Woman beside a Cradle", the National Gallery of London three, including "Young Woman with Five Cavaliers" He is also well represented at St Petersburg, in the Louvre, Buckingham Palace, the Wallace collection (London), and elsewhere Indeed, according to De Groot, most of his best works are in England and the United States In the Metropolitan Museum, New York, are two—"The Courtyard" Morgan collection, and "Interior with a Young Couple," Altman collection, in the Widener collection, Philadelphia, are "Woman and Child in a Courtyard" and "The Bedroom", others are in the Havemeyer, Blodgett, and Borden collections, New York

Bibliography. The best accounts of De Hooch's life and art are in Hofstede de Groot, *Catalogue of Dutch Painters* (London, 1908), and Bode, *Great Masters of Dutch and Flemish Painting* (ib, 1909) Consult also De Rudder, *Pieter de Hooch et son œuvre* (Brussels, 1914)

HOOCHENOO, hōo'chē-nō or KOOTZNAHOO A spirituous liquor concocted by the natives of Alaska and named from one of the tribes of Indians The name has been shortened by the white man to *hooch* and is used as a synonym for any ardent spirit

HOOD, ALEXANDER (1758-98) An English naval officer His first voyage (1767) was aboard the *Romney* with his cousin, Capt Samuel, afterward Viscount, Hood; but in 1772 he went round the world on the *Resolution* with Captain Cook. From 1776 to 1783 he was in active service in North America and the West Indies In 1797 he was appointed to command the *Mars* of the Channel fleet and was one of the captains put ashore by the mutineers off St Helens and Spithead The next year, when his frigate was engaged in the famous duel with the *Hercule*, Captain Hood was mortally wounded at the moment of victory

HOOD, EDWIN PAXTON (1820-85) An English Congregationalist He was born in London, Dec 18, 1820, educated privately, and became a Congregational clergyman in 1852 He held various charges and from 1880 to his death in Paris, June 12, 1885, he was pastor of the Falcon Square Church, Aldersgate Street, London He rendered conspicuous service in raising the funds for the Royal College for Incurables, his pamphlet, "The Palace of Pain"

(1885), having brought in £2000. He was the author of numerous popular volumes among others, *Lamps, Pitchers, and Trumpets*, *Lectures on the Vocation of the Preacher* (1867), a racy volume on homiletics and the history of preaching, and *The World of Moral and Religious Anecdote* (1870). He added to his books on preaching *The Throne of Eloquence*, *Great Preachers*, *Ancient and Modern* (1885) and *The Vocation of the Preacher* (1886). His agreeable book-making powers were exhibited in the biographies of John Milton (1852), Andrew Marvell (1853), Emanuel Swedenborg (1854), William Wordsworth (1856), Thomas Binney (1874), Isaac Watts (1875), Thomas Carlyle (1875), Christmas Evans (1881), Robert Hall (1881), and Oliver Cromwell (1882).

HOOD, JAMES WALKER (1831-) An American bishop of the African Methodist Episcopal Zion church. He was born in Kennett Township, Chester Co., Pa., and was largely self-educated. Entering the ministry in 1858, for two years his work was in Nova Scotia. In 1863 he was a missionary among the members of the negro race in the Union army. He was a member of the Constitutional Convention of North Carolina in 1868, and during the same year was assistant superintendent of public instruction in North Carolina. Elected a bishop in 1872 he came to be senior bishop of his church. In 1879 he was elected president of the board of trustees of Livingstone College, Salisbury, N. C. He is author of *The Negro in the Christian Pulpit* (1884), *One Hundred Years of the African Methodist Episcopal Zion Church* (1895), *The Plan of the Apocalypse* (1900), *A Second Book of Sermons* (1908).

HOOD, JOHN BELL (1831-79). An American soldier, prominent on the Confederate side during the Civil War. He was born in Owingsville, Ky., graduated at West Point in 1853 and saw service for two years in California and against the Indians. He remained in the United States army until 1861, when he resigned to accept a commission in the Confederate service. During the first years of the war he took part in the Virginia campaigns, where his gallantry gained him the rank of major general. At Gettysburg his division was stationed on the extreme right of the Confederate line and took part in some of the most desperate fighting of that bloody battle. He was severely wounded, losing the use of one of his arms. In September, 1863, he was sent to the aid of General Bragg in Tennessee and took part in the battle of Chickamauga, September 19-20, where he lost a leg. The next spring he again took the field and was made a lieutenant general in Johnston's army. During the campaign by which this general sought to impede Sherman's advance on Atlanta, Hood was engaged in several battles, and on May 25, 1864, his corps was attacked by Hooker at New Hope Church. On July 17 he was given the temporary rank of general and was appointed to succeed Johnston in command of the Army of the Tennessee, the Fabian policy of that officer having caused his removal. Sherman was exultant at this change, for he knew that Johnston's wearing tactics would now give place to a policy which would enable him to make good use of his superior fighting strength. On July 20 was fought the battle of Peach Tree Creek, as a result of which Hood was compelled to withdraw into the fortifications about Atlanta, and two days later the

battle of Atlanta followed his flank movement towards Decatur. On July 28 he attacked the Federal forces, but was again compelled to withdraw into his fortifications. After another engagement at Jonesboro, on September 1, he abandoned Atlanta, which was entered by Sherman on the 2d. Hood, after operating for several weeks along the line of Sherman's communications and moving westward into northern Alabama, crossed the Tennessee River about the end of October and began to move northward through Tennessee against General Thomas. After his attack on the Federal forces under Schofield at Franklin had been repulsed (see FRANKLIN, BATTLE OF), he proceeded to Nashville, where he found Thomas stationed with a force about equal to his own. Thomas was not prepared at the outset and for nearly two weeks the two armies faced each other. At last, on December 15, Thomas ordered the attack. The Confederates fought desperately, but were forced back all along the line. That night Hood reformed his army and the next day awaited the Federals on the Overton Hills. Owing to his strong position, he succeeded in repelling the first assault, but the second was more successful, and soon the Confederates were driven in utter rout. As a military force, Hood's army disappeared, and on Jan. 23, 1865, at his own request, he was relieved of his command. After the war he became a commission merchant in New Orleans and president of the New Orleans branch of the Life Association of America. He wrote a book entitled *Advance and Retreat*, *Personal Experiences in the United States and Confederate States Armies* (1880), and wrote a number of articles for *Battles and Leaders of the Civil War* (New York, 1887).

HOOD, MOUNT. A peak of the Cascade Range (qv), on the west border of Wasco Co., Ore. (Map Oregon, D 2). It is about 50 miles east by south of Portland, whence it is reached by rail to Hood River, 66 miles, and thence by stage to the base of the northern glaciers. It has an altitude of 11,225 feet, there are no formidable obstacles to its ascent, and the summit commands an extensive and magnificent view.

HOOD, ROBIN. The hero of a group of English ballads, which represent him as an outlaw, dwelling in Sherwood Forest, Nottinghamshire, or in Barnsdale, a woodland district in the West Riding of Yorkshire. The earliest-known mention of him is in the second version of *Piers Plowman* (about 1377), where Sloth says he "knows rymes of Robyn Hood" (*Skeat*, passus v, II 401, 402). A most important ballad of which he is hero is "A Lytell Geste of Robyn Hode," first printed in 1510, but probably to be dated considerably earlier. This poem consists of 456 four-line stanzas. Among succeeding ballads, of which Professor Child collected 39, are "Robin Hood and Guy of Gisborne," "Robin Hood and the Monk," and "Robin Hood's Death." As early as the last half of the fifteenth century Robin Hood became a popular character in the semidramatic celebrations of May Day, both in England and in Scotland, and later in the regular drama, as in Ben Jonson's beautiful pastoral *The Sad Shepherd*. Robin is the ideal outlaw, courteous, liberal, and reverent. Skillful with the bow, he shoots the King's deer, but he loves the King. He takes from the rich clergy their superfluous goods, but what he does not need himself he gives to the poor. He is chival-

rous towards all women and reveres the Virgin Mary. His chief foe is the sheriff of Nottingham. With him are Little John, Scathlock or Scarlock, Friar Tuck, Maid Marian, Much the Miller's Son, and several others. In his illness Robin goes to a prioress, who is his cousin, to be bled. She allows him to bleed to death. There is a legend that he died at Kirkless, or Kirklees, in the parish of Dewsbury (qv), and Martin Parker declares in his *True Tale* (1632) that an epitaph to him was formerly to be read at the first-named place.

Unsuccessful attempts have been made to prove the real existence of Robin. True, his career as eventually developed has all the details of authentic history, but these were taken from the ballads themselves, or from semihistorical personages, as Hereward the Wake and Wallace, and applied to Robin. Others have tried to connect the surname Hood with Woden, the chief of the Norse gods, or with Hodr (warrior), another Norse divinity. It is now rather thought to be a variant of Hodeken, an elf in Germanic folk tales. Robin is of course a diminutive of Robert. Robin Hood then seems to have been at first only an elf of the woods, about whom later gathered typical adventures of the outlaw. Robin Hood is the hero of a comic opera by Reginald De Koven (qv), and of a play, *Shriwood*, by Alfred Noyes (qv), and Tennyson's *The Foresters* has Robin Hood as its main character.

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HOOD, SAMUEL, VISCOUNT (1724-1816). An English admiral, born at Butleigh, Somersetshire. He embarked at first as captain's servant, then as seaman, was midshipman on Rodney's ship (1743), was lieutenant at 22 and post captain at 32. In 1757 he captured two French privateers and was rewarded by an appointment to a ship of his own. During his retirement from active service (1778-80) he was commissioner of the dockyards at Portsmouth, but went to sea again under Admiral Rodney, as next to him in rank upon the North American squadron. Hood took part in several famous naval battles in 1781-82, notably that of Dominica, for his share in which he was granted an Irish peerage. He was elected member of Parliament for Westminster in 1784, was made Lord of the Admiralty four years later, took command of the British fleet in the Mediterranean in 1793, was promoted to the rank of full admiral in 1794, and in 1796 was made Viscount. He was specially strong as a tactician, and, at the time of his retirement, was described as "the best officer, take him altogether, that England has to boast of." He was governor of Greenwich Hospital from 1796 until his death. Consult Laughton, *From Howard to Nelson* (London, 1899).

HOOD, SIR SAMUEL (1762-1814). A British naval officer. Having entered the navy in 1776, he took part in the fight off Ushant in 1778 and in subsequent engagements, including the capture of the French squadron in the Mona Passage in 1782. Early in 1794 his resourcefulness saved his ship, the *Junó*, from the French at Toulon. As commander of the *Zealous*, he participated in Nelson's attack on Santa Cruz in 1797 and in the Battle of the Nile. In 1801 he commanded the *Venerable* in the action at Algierias and in the victory in the Straits, in 1802 he became commodore of the Leeward Station, where he captured several islands and also the enemy's privateers and men-of-war, and in 1805 he defeated a French squadron off Rochefort, but the engagement cost him an arm. Soon afterward he was promoted to rear admiral. He reduced Madeira in 1807 and in 1808 with the *Implacable* destroyed the Russian ship *Sevolut*. A year later he was made Baronet, and in 1811 vice admiral, from then until his death he served as commander in chief in the East Indies.

HOOD, THOMAS (1799-1845). An English poet and humorist, born in London, May 23, 1799. After leaving school he was placed in a merchant's countinghouse, but, his health failing, he was sent to Dundee. At the age of 19 he returned to London and studied the art of engraving with his uncle. In 1821 he became assistant subeditor of the *London Magazine*. He contributed to it considerable verse and made the acquaintance of its brilliant staff, which included De Quincey, Hazlitt, and Lamb. His first separate publication was entitled *Odes and Addresses on Great People*, written in conjunction with J. H. Reynolds (1825). In 1826 he published *Whims and Oddities*, of which a second series appeared during the following year. In 1830 he began the *Comic Annual* and continued it for nine years. The same year he edited the *Gem*, one of the popular annuals, contributing to its pages his striking poem entitled 'Eugene Aram's Dream.' In 1824 Hood married the sister of J. H. Reynolds, and in 1831 he went to reside at Wanstead in Essex, where he wrote his novel *Tynney Hall* (1834). While there he suffered from the failure of a publisher. In 1835, now weakened in health, he went to the Continent, where he remained five years, first at Coblenz on the Rhine and then at Ostend. He, however, continued his *Comic Annuals*, started *Hood's Own* (1838), containing a portrait and reminiscences, and made Smollett's *Humphrey Clinker* a framework for some humorous sketches called *Up the Rhine* (1839). In 1840 he returned to England and began to write for the *New Monthly Magazine*, of which he became editor the following year. Here appeared "Miss Kilmansegg," his best comic poem. Withdrawing from this magazine towards the close of 1843, he started *Hood's Magazine*, January, 1844, and in the same year collected his fugitive pieces under the title of *Whimsicalities*, which were illustrated by Leech. By Christmas he took to his bed, which he never again left. During his last illness Sir Robert Peel conferred on him a pension of £100 a year, which he transferred to his wife. He died May 3, 1845, and was buried in Kensal Green Cemetery.

Hood takes a high place both as humorist and as serious poet. He excels at once in comedy and in pathos, and he sometimes curiously mingles and combines both. As a punster, he is—whether to his glory or no—supreme, he con-

nects far-separated words and ideas by the most subtle analogies and sends them loose. Much of his comedy, however, is verbal and shallow and will be soon forgotten. It is as a poet that Hood will be remembered. His "Eugene Aram's Dream," "Song of the Shirt," and "Bridge of Sighs" are among the most perfect poems of their kind in the English language. Consult *Literary Reminiscences in Hood's Own* (1st series, London, 1838), *Memorials*, edited by his daughter (ib, 1860), Eliot, *Hood in Scotland* (Dundee, 1885), W. C. Jerrold, *Thomas Hood, His Life and Times* (New York, 1909); *Works*, edited by his son and daughter (10 vols, London, 1869-73), *Poems*, edited by Ainger, in "Everley Series" (12 vols, ib, 1897), *Haunted House*, with memoir by Austin Dobson (ib, 1895). His collected works appeared in 1882-84.

HOODED CROW (so called from the marking on the head). A true crow (*Corvus cornix*) of the north of Europe, also called in England dun, or gray, and Royston crow, and in Scotland hoodie. The head, fore parts, and wings are glossy black, the remainder of the body ash color, the bill and feet black. It is slightly migratory and retreats southward in winter from the most northerly parts of Europe and Siberia when the other crows go south. Its general habits are those of the carrion crow, with which it interbreeds extensively, so that some naturalists believe the two birds to be varieties of one species. See Newton, *Dictionary of Birds* (London and New York, 1896).

The hooded crow of India is a smaller species (*Corvus splendens*) of similar appearance. It is tame to the point of being a nuisance to Europeans wherever it is numerous. Hardly a station or camp in British India, it is said, is free from a crowd of these feathered thieves. They have the amusing habit of building their nests of the wire from discarded soda-water bottles.

HOODED MERGANSER. See MERGANSER.

HOODED SEAL. A large seal (*Cystophora cristata*), inhabiting the coasts of Greenland and North America as far south as the United States. It also occurs on the coasts of Sweden and Norway and in the Arctic Ocean. It is found generally in the icy islands or floating ice fields in the open sea and visits the land in April, May, and June. About 2 inches from the extremity of the upper jaw there is a cartilaginous crest, increasing in height as it passes backward to the back part of the head, where it is about 7 inches high and has a longitudinal depression in the middle, about an inch deep. This crest is an elongation of the septum of the nose, and the true nostrils open on either side of it. It is covered by a muscular hood clothed with fur. The whole apparatus is probably defensive, but may be accessory to the organ of smell and, as the fishermen suppose, may serve as a reservoir of air while the animal is under water. The hood is wanting in the females and young. The hooded seal is polygamous and brings forth its young on the ice. It has a voice resembling the bark and whine of a dog and when attacked weeps copious tears.

HOODED WARBLER (so called from the marking on the head). One of the most beautiful and active of the American fly-catching warblers. (See WARBLER.) It is olive green above and yellow below, with the head, neck, and breast deep black. It inhabits in summer the eastern United States, where it frequents thickets and undergrowth and makes a soft, cuplike nest in

low bushes. Its systematic name is *Wilsonia citrina*. See Colored Plate of WOOD WARBLERS with WARBLER.

HOODIE. See HOODED CROW.

HOOD OF AVALON, ARTHUR WILLIAM ACLAUD WOOD, BARON (1824-1901). A British naval officer, born at Bath. Entering the navy in 1836, until 1854 he served on the *President* and the *Arethusa*, largely in the Mediterranean. In command of the *Acorn* he participated in the engagements at Fatschan, China, and in the capture of Canton in 1857, and for these services was promoted to captain in 1858. He commanded the *Pylades* in 1862-66, had charge of the school of gunnery on board of the *Excellent* in 1866-69, and then was appointed director of naval ordnance. After commanding the *Monarch* in 1874-76 he was promoted to rear admiral, was Lord Commissioner of the Admiralty in 1877-79, commanded the Channel fleet in 1880-82, became full admiral in 1885, and retired in 1889. He was made a peer in 1892.

HOOD RIVER. A city and the county seat of Hood River Co., Oreg., 66 miles by rail east of Portland, on the Columbia River, and on the Mount Hood and the Oregon-Washington Railroad and Navigation Company main lines (Map: Oregon, D 2). It contains a Carnegie library, county hospital, fine high school, and municipal water works. Hood River is in a great fruit-growing region, noted particularly for its apples and strawberries, and has saw and planing mills, evaporators, canneries, a vinegar factory, a cooperation creamery, a meat-packing plant, a concentrated cider and apple sirup factory, machine shops, and wagon works. Pop., 1910, 2331.

HOOF (AS *hōf*, OHG *huof*, Ger *Huf*, connected with OChurch Slav. *kopyto*, hoof, or with Skt *śapha*, Av. *safa*, hoof). The exterior horny covering of the foot of many animals. The healthy soundness of the horse's foot is mainly preserved by permitting it to grow uninjured by the rasp and knife, its toughness is secured, and undue dryness and evaporation prevented, by smearing daily the crust, sole, and frog with a little glycerin, or a mixture of a pound of lard and a quarter of a pound each of tar, honey, beeswax, and glycerin melted together. Softness and brittleness of the hoof, which are common sources of cracks and corns, may be remedied by the regular use of such dressings, by placing the feet for several hours daily in thick woolen swabs, kept cool and moist by frequent applications of cold water, and by encouraging a more healthy growth of horn by occasional mild blisters round the coronary band. Cracks—or sand cracks, as they are termed—mostly occur among horses much upon the road, cause lameness, and constitute unsoundness. When serious and recent, poulticing, thinning away of the crust about the crack, and perfect rest are essential. After the earlier heat and tenderness are removed, a hot iron should be drawn at right angles to the crack, both above and below, so as to separate the diseased from the sound horn. Waxed thread or fine wire should be wound round the hoof, and a sound growth of horn stimulated by a blister round the coronet. The horse's hoofs are too hard and coarse to be employed for the making of the better class of combs and buttons, for which purpose the hoofs of cattle are extensively employed. They are, however, largely used by manufacturers of prussiate of potash and artificial manures. See CORN.

HOOFEN, JAN VAN DER See HOEVEN

HOFFT, höft, PIETER CORNELISZON (1581-1647) A Dutch poet and historian, born in Amsterdam—after Vondel, probably Holland's greatest author. He was the son of an Amsterdam burgomaster, received a thorough education in the classics, and made an extensive journey through France, Germany, and Italy. After his return in 1601 he studied jurisprudence at Leyden, and was appointed bailiff of Muiden. At the castle of Muiden and in Amsterdam he gathered around him the most celebrated artists, poets, and scholars of the day, known in Dutch literary history as the "Muiden circle." He is considered one of the first, if not the first, of Dutch prose writers, despite his too frequent Latinisms. His letters are particularly charming and are free from this tailing. Among his poetical works are the pastoral play in Italian style, *Granida* (1615), the tragedies *Geeraerd van Telzen* (1613), *Theseus en Ariadne* (1614), and *Baeto* (1626). His chief historical works are *Hendrik de Groot* (1626), *Rampzaligheden der verheffing van den huize Medicis* (1636): *De nederlandsche Historien* (2 vols., 1642). The latter is one of the classics of Dutch literature and Hooft's chief work. He also translated Tacitus, of whom he was an imitator, and he is often called the "Dutch Tacitus." His *Poems* were published in 1636 (new complete edition, ed P. Leendertz, Haarlem, 1864). His erotic verse is particularly notable as being the first of this genre to appear in Dutch literature. Consult his *Breven*, edited by J. van Vloten (Leyden, 1855-57).

HOOGVEEN, hō'ge-vān' One of the ten colonies of the Netherlands, situated in the Province of Drenthe (Map: Netherlands, E 2). It has extensive peat mines and shipyards and is engaged in farming and cattle raising. Pop., 1890, 11,924, 1911, 12,691.

HOOGH, PIETER DE See HOOGH.

HOGLY, hōg'li See HUGLI.

HOOGSTRAETEN, hōc'stra'ten, SAMUEL VAN (1627-78) A Dutch painter and engraver, born at Dordrecht. He was the pupil of his father, Dirk van Hoogstraeten (1596-1640), and afterward of Rembrandt. He began as a portrait painter in the manner of his last master, but afterward was influenced by the Italian school and did landscape and still life. In this style he is reminiscent of Pieter de Hooch. In 1651 he went to Vienna and Rome and in 1662 visited England. He is the author of an *Introduction to the High Art School* (1678), which is full of admiration for Rembrandt and has preserved many of his sayings. There are pictures by him in the museums of Amsterdam, The Hague, Vienna, and Dordrecht, and in the Metropolitan Museum, New York.

HOOGSTRAETEN, hōc'stra'ten, JAKOB VAN (c 1454-1527). A Belgian priest and inquisitor, born at Hoogstraeten. After studying at the universities of Louvain and Cologne, he entered the Dominican Order and became doctor and professor of theology and prior of the order at Cologne (1507). He is widely known through his controversy with the celebrated humanist Reuchlin. Hoogstraten proposed to burn all the Jewish books, on the ground that they contained nothing but calumnies against Christ. Reuchlin persuaded the Emperor Maximilian against this course and thereby incurred the enmity of the inquisitor, who subjected him to every persecution. Thereupon there ensued the polemic war

called by Erasmus "the beginning of the Lutheran tragedy," and this was the occasion of the famous *Epistola Obscurorum Virorum*. Hoogstraten's epitaph, as composed by his enemies, is a severe arraignment of the man's character—*Hic jacet Hoogstratus viventem ferre patique quem potuerit mali, non potuerit boni*. Among his treatises are *Destructio Cabbalæ contra Reuchlinum* (1518) and *De Christiana libertate Tractatus V contra Lutherum* (1526).

HOOK, JAMES CLARKE (1819-1907) An English marine painter, born in London. He entered the schools of the Royal Academy in 1836 and was elected academician in 1860. In 1846 he won the traveling scholarship with "Rizpah Watching the Dead Sons of Saul" and went abroad for three years, working diligently at the Louvre and in Italy gaining much from Titian, Tintoretto, Carpaccio, and other Venetians. Among his best paintings are "A Dream of Ancient Venice" (1848), "A Rest by the Wayside" (1854); "A Signal on the Horizon" (1857), "A Widow's Son Going to Sea" (1859), "Stand Clear" (1860). All except the first are pastoral and idyllic English scenes. In the Tate Gallery are "Home with the Tide," "Young Dreams," "The Seaweed Rakes," and "The Stream." Hook's work is characterized by brilliant color and fresh realism.

HOOK, THEODORE EDWARD (1788-1841) An English wit and novelist, son of James Hook, a musical composer, born in London, Sept. 22, 1788. Educated mostly at private schools, he attended for a short time Harrow and Oxford. Between 1805 and 1811, while yet a boy, he produced, either single-handed or in conjunction with his father, 13 comic operas and melodramas, all of which were popular at the time. His ready wit, sparkling humor, and wonderful powers of improvisation made him the delight of society, and having pleased the Prince Regent, he was appointed (1813) Accountant General and Treasurer at Mauritius, with a salary and allowances amounting to nearly £2000 a year. These offices he held till 1818, when the discovery of a deficiency of £62,000 in the military chest caused him to be arrested and sent to England, and his effects seized and sold. The peculation, it afterward appeared, had been committed by a clerk, who committed suicide. On obtaining his liberty Hook supported himself by writing for the newspapers and magazines, and on the establishment of *John Bull*, a weekly Tory newspaper, in 1820, he was appointed its editor. From his connection with this bold, clever, and virulent print he derived during its prosperous state fully £2000 a year. In August, 1823, he was arrested for his debt to the crown, and his property sold. He remained within the rules of the King's Bench till May, 1825, when he was released from custody. In 1824 appeared, in three volumes, the first series of his *Sayings and Doings*, which yielded him £2000. A second series followed in 1825, and a third in 1828, for each of which he seems to have received about 1000 guineas. Several other novels followed—*Maxwell* (1830), *Gilbert Gurney* (1836), in part autobiographic, *Gurney Married* (1838), *Births, Deaths, and Marriages* (1839). From 1836 to 1841 he edited the *New Monthly Magazine*. He died Aug. 24, 1841. Hook's novels are sketches of contemporary manners, and as such they possess value. Exceedingly popular in their own day, they are now difficult reading, for the witty thrusts are no longer obvi-

ous. Hook himself was regarded by his later contemporaries as a jester. He is the original of Lucian Gay in Disraeli's *Coningsby* and is introduced in *Vanity Fair* as Mr Wagg. The better side of his character is given by Lockhart in the *Quarterly Review*, vol. xxii (London, 1845). Consult *Humorous Works* (ib., 1873), and Baiham, *Life and Remains of Hook* (ib., 1849, revised, 1899).

HOOK, WALTER FARQUHAR (1798-1875). An English dean and ecclesiastical historian. He was the nephew of the humorist Theodore Hook and the son of Dr James Hook, dean of Worcester. He was born in London and graduated M.A. at Christ Church, Oxford, in 1824. He took holy orders in 1821 and, after holding curacies in the Isle of Wight and in Birmingham, was vicar of Holy Trinity, Coventry, from 1828 to 1837, when he became incumbent of Leeds. Here by his tact and resourcefulness he overcame strenuous opposition on the part of Dissenters and among the working classes, who objected to compulsory Church rates, won great popularity, and in 1859, when he became dean of Chichester, left Leeds richer by 21 new churches, 29 vicarages, and 27 schools. From 1827 he was chaplain in ordinary to George IV, William IV, and Victoria, on the accession of the latter preaching in the Chapel Royal his famous sermon, "Hear the Church," of which 28 editions, numbering over 100,000 copies, were sold in a short time. Its great vogue was due to the claim that the Anglican church of the sixteenth century was a reformed church and a return to the early English church founded by the Apostles. At Chichester he wrote his most important work, *Lives of the Archbishops of Canterbury* (12 vols., 1860-76). Besides sermons and devotional works, he published *A Church Dictionary* (1842, 14th ed., 1887) and *Dictionary of Ecclesiastical Biography* (8 vols., 1845-52). His memory is perpetuated in Leeds by a handsome Gothic memorial church, completed in 1880. Consult Stephens, *Life and Letters of Dean Hook* (London, 1878).

HOOKER, NATHANIEL, or NATHANAEL (?1690-1763). A British author, born in Ireland, a friend of Pope, of Martha Blount, and of many notables of his day, and a disciple of Fénelon. He studied law, but practiced literature, beginning with a translation of the *Life of Fénelon* (1725) and *An Account of the Conduct of the Douagie Duchess of Marlborough* (1742), taken down from her dictation, and ending with a *Roman History from the Building of Rome to the Ruin of the Commonwealth* (4 vols., 1738-71), the latter half of which was not published till after his death, while the latest edition (6 vols.) came out in 1830. In 1791 a work of his attacking Chesterfield's *Letters* appeared.

HOOKER, ROBERT (1635-1703). An English physicist. He was born on the Isle of Wight and was educated at Westminster School and at Christ Church, Oxford. He assisted Boyle in the construction of his air pump, and in 1662 was appointed curator of experiments to the Royal Society. In 1664 he became professor of geometry in Gresham College, London. In 1667 he was appointed city surveyor, though his model for rebuilding the city of London after the great fire of 1666 had not been adopted. From 1677 to 1682 he was secretary to the Royal Society. Though a man of extraordinary acuteness of perception and inventive genius, Hooke did not always enjoy the esteem of his contemporaries,

owing to his peevish and excitable temper. He claimed priority—in many cases justly—to some of the most important discoveries and inventions of the time, and authorities admit that he was the first to recognize clearly that the problem of planetary motion should be treated as a purely mechanical one. He undoubtedly grasped the fundamental principle upon which Newton subsequently constructed the theory of gravitation, he failed, however, to develop it mathematically. Among his important inventions were the use of the balance spring for the regulation of watches, and many useful improvements in physical and astronomical instruments. His publications include *Micrographica* (1666), the *Lectures Cuticularæ* (1678-79), and his *Posthumous Works* (1705).

HOOKE, WILLIAM (1601-78). An English clergyman, domestic chaplain to Oliver Cromwell. He was born in Southampton, was educated at Oxford, and after one charge in Devonshire went to America and took charge of a church at Taunton, Mass. (1637-44). His next congregation was in New Haven, but he returned to England in 1656, and, as his wife was Cromwell's cousin, the Protector made him master of the Savoy Hospital in Westminster, also his own chaplain. Some of Hooke's sermons were published, as well as his *New England's Tears for Old England's Fears* (1640).

HOOKER, BRIAN (WILLIAM BRIAN) (1880-). An American author. He was born in New York City and was educated at Yale University (A.B., 1902, A.M., 1904). He served as an assistant in English at Columbia University in 1903-05 and as an instructor in rhetoric at Yale in 1905-09. He won the Cook prize in 1901 and the Heald prize in 1907, became a contributor to magazines, and wrote the libretto for an opera, *Mona* (music by Horatio Parker), which in 1911 was awarded a \$10,000 prize by the Metropolitan Opera Company. In 1912 he received an honorary M.A. from Yale, and he was made a member of the National Institute of Arts and Letters, and in 1914, together with Horatio Parker, was awarded a \$10,000 prize by Los Angeles for the libretto of an opera to be produced on the occasion of the city's centenary. He is author of *The Right Man* (1908), *The Professor's Mystery* (1911), with Wells Hastings, *Poems* (1913), *Mother of Men, Old Yale* (new ed., 1914).

HOOKER, JOSEPH (1814-79). A distinguished American soldier. He was born at Hadley, Mass., Nov. 13, 1814, graduated at West Point in 1837 in the same class with Jubal Early and Bixton Bragg, and was assigned to the First Artillery. He served in Florida and on the Maine frontier in 1837-40 and was adjutant at West Point in 1841 and of his regiment from 1841 to 1846. During the Mexican War he served as aid to Generals Persifer F. Smith, Thomas L. Harmer, William O. Butler, and Gideon J. Pillow, participated in the principal battles both of the northern and of the southern campaign, receiving the brevets of captain, major, and lieutenant colonel for gallantry, became captain in 1848, was assistant adjutant general to the Pacific Division in 1849-51 and resigned from the army Feb. 21, 1853. From that date until the outbreak of the Civil War he was in turn farmer, civil engineer, and colonel of California militia. He was appointed brigadier general of volunteers, May 17, 1861, and in March, 1862, was assigned to the command of the Second Dr-

vision, Third Corps, Army of the Potomac. On May 5, 1862, he became major general of volunteers, and at the battle of Williamsburg, Va., fought on that day, handled his division with skill and valor. Hooker's soldierly qualities won for him the sobriquet of Fighting Joe. He was active throughout the Peninsular campaign and subsequently was conspicuous in the battles of Bristoe Station, the second battle of Bull Run, and Chantilly. In the Maryland campaign, as commander of the First Corps, he took part in the battles of South Mountain and Antietam, being wounded in the latter engagement. He was appointed brigadier general in the regular army Sept. 20, 1862.

In November, 1862, he was placed in command of the Fifth Corps and at the battle of Fredericksburg (qv) commanded the entire grand division of the Army of the Potomac, comprising the Third and Fifth Corps. On Jan. 26, 1863, he was assigned by President Lincoln to the command of the Army of the Potomac. His first act was to refit and reorganize the army. In a few months he had recruited depleted regiments, supplied them with new clothing and equipments, weeded out incompetent officers, armed, equipped, and organized the mounted troops in a single corps, and in other ways had infused new life into the army.

In his new command General Hooker failed, however, to show those qualities on the battlefield which had distinguished him as a corps and division commander. With the greater part of his army he advanced against General Lee, who then had a force half the size of his own, and who was stationed south of the Rappahannock, with the intention of attacking him in flank and rear and crushing him at one blow. His plans were somewhat deranged by high water and the failure of his cavalry under Stoneman to cut Lee's communications. While in position around Chancellorsville, his right flank was surprised by the Confederate General Jackson, one corps was thrown into confusion, and after a protracted struggle, lasting from the 2d to the 4th of May, in which both armies suffered great losses, the Army of the Potomac was forced to recross the Rappahannock. While the fighting was hottest, on May 3, Hooker was stunned, a pillar against which he was leaning having been struck by a cannon ball. The disastrous result was largely due to his vacillation and his inability to cope with an emergency. (See CHANCELLORSVILLE, BATTLE OF.) After the battle Hooker and Lee stood for some time facing each other across the Rappahannock, and shortly after Lee had started on his aggressive campaign which terminated in the battle of Gettysburg, Hooker broke up his camp and followed. The pressure of public opinion in the North, however, combined with friction between General Hooker and General Halleck, and growing lack of confidence in Hooker on the part of President Lincoln caused him to offer his resignation, and on June 28, 1863, General Meade succeeded him. The government then gave him command of the Eleventh and Twelfth Corps, later combined to form the Twentieth Corps (Army of the Cumberland), and sent him (Sept. 24, 1863) to reinforce Rosecrans at Chattanooga. On November 24, in the so-called 'battle among the clouds,' at the head of his new command, he led a charge in the face of the Confederate artillery and infantry posted on Lookout Mountain. For his conduct on this occasion he was, on March 13, 1865, brevetted

major general in the regular army. He further distinguished himself under Sherman at Dalton and Resaca and in the attack on Atlanta. At his own request (July 30, 1864), he was placed on waiting orders September 28, when he was put in command of the Northern Department. On July 8, 1865, he was given charge of the Department of the East and soon afterward of the Department of the Lakes, with headquarters at Detroit, where he remained until 1867. A paralytic attack occasioned his retirement from active service (Oct. 15, 1868), with the full rank of major general in the regular army. General Hooker was a man of handsome physique and of great personal magnetism. He died at Garden City, L. I., Oct. 21, 1879. An equestrian statue of him by French and Potter stands in State House Park, Boston.

HOOKER, SIR JOSEPH DALTON (1817-1911)

One of the most eminent of English botanists, the second son of Sir William Jackson Hooker (qv). He was born at Halesworth, Suffolk, England, and graduated in medicine (1839) at the University of Glasgow, where his father was professor. Hooker's botanical work began in his father's herbarium, and his early interests were mainly in the lower groups of plants, particularly the mosses. In 1839 he was commissioned botanist to the Antarctic expedition under the command of Sir James Ross and in this capacity acquired an extensive knowledge of the floras of the south temperate and subantarctic regions. The results of this expedition were published in six large quarto volumes, under the general title *The Botany of the Antarctic Voyage of H. M. Discovery Ships Erebus and Terror in the Years 1839-1843 under the Command of Captain Sir James Clark Ross* (1844-60). Hooker also early developed an interest in fossil botany, and this was fostered by his appointment in 1845 to the position of botanist to the Geological Survey of Great Britain. He remained in the service of the survey for about two years and made important contributions to paleobotanical literature. The desire for a more extended knowledge of the flora of the Oriental tropics led him to organize a botanical expedition to India, which entered this field in 1848. Some of the results of Hooker's early observations in India were published in *The Himalayan Journals* and *Flora Indica*, the latter work being written jointly with Dr. Thomas Thomson of the Botanical Gardens, Calcutta. For 10 years after 1855 he was assistant director of the Royal Botanical Gardens at Kew. This was a decade of extraordinary activity in botanical exploration and in the study of herbarium collections. Hooker's greatest undertaking during this period was the *Genera Plantarum*, in collaboration with George Bentham (qv), the first part was issued in 1862. Upon the death of his father Hooker succeeded him in the directorship of the Kew Gardens, a post which he occupied for about 20 years. Under his supervision great improvements were made at the Gardens, the collections at the Kew herbarium were largely increased, and important publications were completed or continued. With all these duties Hooker found time for further botanical explorations in various parts of the world, including an expedition to Morocco (1871) and a visit to the United States (1877), where in company with Asa Gray (qv) an expedition was made across the continent to California. In 1885 Hooker retired from the directorship of Kew, but continued actively in

botanical work. The number of his titles exceeds 200 and includes not merely standard taxonomic publications, covering various regions of the world, but also publications in plant geography. In this field Hooker was perhaps at his best. His personal knowledge of the floras of the world was unrivaled, and his papers upon plant geography are full of originality and are regarded as a conspicuous part of the foundations of that science. He was an intimate friend of Darwin, and it was through his influence and that of Sir Charles Lyell that Darwin was induced to publish the first statement of his theory of natural selection, in 1858. He was president of the British Association in 1868 and delivered a remarkable presidential address in which he championed Darwin's theory of natural selection. He was knighted in 1877, received the Order of Merit in 1907, and was honored by numerous scientific societies at home and abroad.

HOOKER, MOUNT One of the loftiest peaks of the Rocky Mountains in Canada, situated near the boundary of British Columbia and Alberta (Map Canada, G 6). It has an estimated elevation of 15,700 feet.

HOOKER, RICHARD (c 1553-1600) An English clergyman, author of the most famous existing treatise on the constitution of the Church of England. He was born near Eweter in the year 1553 or 1554, of poor parents. He was a grave, bashful, and quiet boy, diligent in his studies and quick at learning. His early progress was so rapid that his uncle, John Hooker, was induced to aid him in pursuing his education further. With additional help from John Jewel, Bishop of Salisbury, who afterward became his patron, he was enabled to go to Oxford, where he entered Corpus Christi College in 1567. He became a scholar of Corpus Christi in 1573, was admitted to the degree of M.A. in 1577, and the same year became a fellow. The range of his learning was wide and by no means confined to theology. From the age of 19 he served as tutor, and in 1579 he was summoned, in an emergency, to deliver the Hebrew lecture, which he did so much to the satisfaction of the authorities that he continued to perform this duty so long as he remained at Oxford. For some unknown reason—perhaps through Puritan influence—he was once temporarily suspended from college, but honorably restored within a month. In 1582 Hooker took holy orders and not long after married, Walton says, to his own sorrow. This marriage put an end to Hooker's quiet and congenial Oxford life. He was now obliged to seek a parish. He received the modest living of Drayton-Beauchamp in Buckinghamshire (1584), where he lived, rather uncomfortably, for about a year. At the end of that period his fortunes were bettered by his being made Master of the Temple, London, though his preference was for a living in the country.

Hooker's London life was troubled with ecclesiastical controversy, which he disliked, yet which he would not attempt to avoid when once it was forced upon him. His colleague, Travers, represented that party in the Church of England which desired the adoption of Genevan ideas and usages, whereas Hooker stood for the episcopal establishment. These opposite views were reflected in the preaching at the Temple. "The forenoon sermon spake Canterbury, and the afternoon Geneva," was the current saying. Presbyterianism was either more popular, or else it had the better presentation, for we hear that the

congregation "ebbed in the morning" (when Hooker preached) and "flowed in the afternoon" (to hear Travers). The Puritan champion was at last silenced by Archbishop Whitgift, but the discussion was continued in print. Hooker was so deeply stirred by the question at issue that he determined to give it exhaustive treatment in book form and at once entered upon the preparation of what became the celebrated *Laws of Ecclesiastical Polity*. To carry out his design a change of scene was necessary, and Hooker sought once more the quiet of a country parish and found it at Boscombe in Hants (1591). At the same time he was made a minor prebend of Salisbury, which added to his income without increasing his labor. In Boscombe Hooker wrote the first four books of the *Laws*, and they were published in 1594. The following year he removed to Bishopsbourne in Kent, where he spent the remainder of his life. Book v of the *Laws* appeared in 1597, and there is reason to believe that the other three books were written here, although they were not published. There were to be eight books in all, according to Hooker's original plan. The *Laws* were hailed as the best defense of the Anglican position ever written. Visitors sought the author out in his retreat, but he himself was all unconscious of the important position he had come to occupy. His days were passed in quiet labor, and he continued to fulfill every duty of his parish with conscientious fidelity until his death, Nov. 2, 1600, at the comparatively early age of 47.

Hooker's reputation rests upon his writings, not upon his preaching. In personal appearance he was not prepossessing, and his manner in the pulpit was not effective. But as the author of the *Ecclesiastical Polity* he stands in the front rank of English men of letters. This work is a monument of literary style, in the formative period of English prose, besides being the most important contribution to the subject of Church government in the language. We have the first five books precisely as Hooker wrote them. The fate of books vi to viii in their completed form is shrouded in mystery. Walton relates that the manuscript was destroyed by Puritan relatives of Mrs. Hooker, but that the earlier rough drafts were preserved. From these, long afterward, the seventh and eighth books were printed. What claimed to be a sixth book appeared in 1648, along with the eighth, but most of this probably does not belong to the *Laws* at all. The whole eight books were republished, with a life of Hooker by Izaak Walton, in 1666, since which time they have passed through many editions. In substance the *Ecclesiastical Polity* is a treatise on Church and civil government. His object was to defend episcopacy, but he also states a theory of government which was fruitful in English thought. Hooker's conception of the origin of the state resembles the "social compact" theory of more recent times. The Church he holds to be simply the English state, looked at from the religious point of view. He defends the Established church system, with all its ceremonial, but he does this with singular moderation, holding it to be a matter of expediency rather than of necessity, and he invariably accords courteous treatment to his opponents. In discussing the theories of Presbyterians and Independents, he points out what he believes to be their fundamental defects, and he defends the episcopal theory on scriptural and rational grounds as well as because of its antiquity and practical success.

All succeeding writers on the English church have built upon the foundations which Hooker laid.

Hooker's *Works* (including the *Ecclesiastical Polity*, the controversy with Travers, a *Discourse of Justification*, and a few *Sermons*) were published by John Keble (4 vols., 1836). This edition superseded all previous ones. It was reissued, with improvements (7th ed.) by Dean Church and Canon Paget, in 1888. Consult Izaak Walton, *Life of Richard Hooker*, prefixed to most editions of his works (Oxford, 1836).

HOOKER, THOMAS (c1586-1647) A New England clergyman, the real founder of the Colony of Connecticut. He was born at Markfield, Leicestershire, England, and was educated at Emmanuel College, Cambridge, where he took the degree of B.A. in 1608 and that of M.A. in 1611. After holding a fellowship for some time at Cambridge, he became, about 1620, rector of a little church at Esher in Surrey. In 1626 he accepted a lectureship at Chelmsford, Essex, where he soon won renown as an eloquent preacher, but by this very prominence attracted the attention of Laud, then Bishop of London, to his Puritanism. In May, 1629, he appeared before Laud and was threatened by him with action before the Court of High Commission, and in the following year, upon being cited to appear before that tribunal, he left England and settled in Holland. In Holland he remained for three years, preaching in the English churches at Amsterdam, Delft, and Rotterdam. In 1633 he sailed for New England, on the same ship with John Cotton (qv), settling in Newtowne (Cambridge) in October of that year and being admitted a freeman in the following spring. He was chosen pastor of the first church at Newtowne on Oct. 11, 1633, and soon afterward became one of the most influential clergymen in the Colony. It was he who in October, 1635, argued with Roger Williams before the General Court. There was something of a spirit of rivalry, not only between the people of Newtowne and Boston, but between their principal pastors, Hooker and Cotton. As early as May, 1634, the people of Newtowne complained to the General Court that they did not have room enough and sought either for permission to extend their boundaries or remove to a new location, and in July they sent a small party into the Connecticut valley to find a suitable place. The matter was temporarily adjusted by the extension of the town limits, but the spirit of unrest remained, and in 1636 Mr. Hooker and his church, with large delegations from the churches at Dochester and Watertown, removed into the Connecticut valley. The Newtowne church members established themselves at Hartford, but the influence of Hooker extended also to the towns of Windsor and Wethersfield, which were settled by others who had followed his lead into the new country. It is not only as the leader and moving spirit of the new settlements that Hooker deserves to be known, but as the inspirer, if not the actual author, of the Fundamental Laws which delegates from the several river towns adopted for their government in 1639. In January, 1639, Hooker accompanied John Haynes, the first Governor of Connecticut, to Boston to confer with Winthrop concerning a proposed confederation of the New England settlements to provide for their mutual defense against the Dutch, the Indians, and the French. The year 1643 saw the result of their labors in the successful organi-

zation of the 'United Colonies of New England,' the first attempt at federal government in America. Hooker published a great many sermons and also *The Soule's Preparation for Christ* (1632), *The Soule's Implantation* (1637), *The Soule's Ingrafting into Christ* (1637), *The Soule's Exaltation* (1638), *The Soule's Vocation* (1638), *An Exposition of the Principles of Religion* (1630), *The Saint's Guide* (1645), *A Survey of the Summe of Church Discipline* (1648), a defense of the New England churches which had great influence in the development of Congregationalism in America, *An Application of Redemption* (1657), *Poor Doubting Sinner Drawn to Christ* (7th ed., 1743). A selection from his works, with memoir by E. W. Hooker, was published in 1849. Consult Cotton Mather, *Magnalia Christi Americana* (London, 1702), Johnston, *Connecticut*, in the "American Commonwealths Series" (Boston, 1878); Walker, *History of the First Church in Hartford* (Hartford, 1883), Johns Hopkins University Studies, vol. vii (Baltimore, 1889), Walker, *Thomas Hooker*, in "Makers of America Series" (New York, 1891).

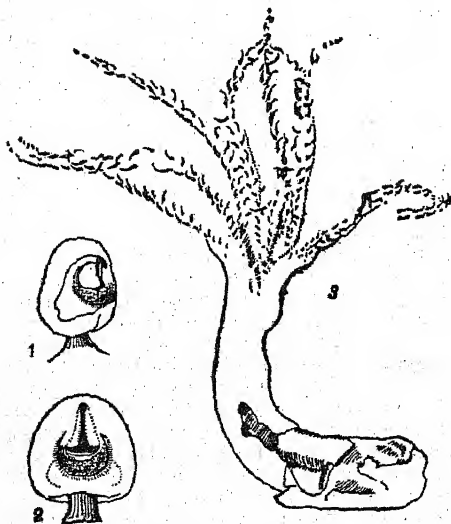
HOOKER, SIR WILLIAM JACKSON (1785-1865) A celebrated English botanist. He was born at Norwich and studied branches of natural history as a pastime during his youth. In 1811 he published his first work, *Journal of a Tour in Iceland*, of which a second edition was demanded in 1813. From that time forward he was constantly busy in the publication of botanical works. His investigation of the British Jungermanniæ and mosses led to his appointment to the chair of botany in Glasgow University, where he lectured with marked success until 1841, when he became director of the Royal Gardens at Kew. Here his pronounced executive ability wrought wonders. The Gardens, which at that time consisted of 11 acres, were extended to 45, in addition to which a park of 240 acres was added; the 10 old conservatories were replaced by 25 much larger ones of more modern construction, in conjunction with Henslow, he founded the most complete museum of botany in the world, and by his enormous correspondence with and ready aid to botanists throughout the realm, Kew Gardens became the distributing point of hundreds of useful plants, which were sent there in collections and then shipped to colonies for testing. Through his efforts Great Britain has largely extended her commerce in products of the soil. Accompanying his official duties he was collecting for his private herbarium and writing books on botany which at the time of his death numbered about 100 volumes. His herbarium was purchased by the nation after his death. His name was enrolled in the lists of all scientific societies at home and abroad, and on account of his scientific acquirements he was knighted in 1836. Among his works may be mentioned *Monograph of the British Jungermanniæ* (1812-13), *Muscologia Britannica* (1818); *The British Flora* (1830, seven editions), *Flora Boreali-Americana* (1840), *A Century of Orchidaceous Plants* (1848), *Icones Plantarum*, in 10 volumes (1837-60), *British Ferns* (1862), *Garden Ferns* (1862).

HOOKER, WORTHINGTON (1806-67) An American physician, born in Springfield, Mass. He graduated at Yale in 1825 and in medicine at Harvard in 1829 and practiced in Connecticut until 1852, from which time until his death he was professor of the theory and practice of medi-

cine in Yale. He was vice president of the American Medical Association in 1864. His principal works are: *Physician and Patient* (1849); *Homœopathy: An Examination of the Doctrines and Evidences* (1852); *Rational Therapeutics* (1857). His *Child's Book of Nature* achieved a deserved reputation and is still widely used.

HOOK GAGE. An instrument invented by Uriah Boyden for measuring differences in level in a surface of water. It consists of a hook whose longer arm carries a vernier in connection with a graduated vertical scale, while the short arm terminates in a point which is adjusted in contact with the surface of the water from below, so that when the surface film is touched the point of contact is clearly and definitely indicated. Any difference in level may be read by adjusting the point at the different points and reading from the scale and vernier. In still water this instrument is said to be so delicate that a variation of 0.0001 of a foot may readily be observed.

HOOK SQUID. A squid of the family Onychoteuthidae, allied to the common squids, but having the eyes destitute of any covering of skin. The two longer arms, or tentacles, and sometimes the shorter arms, bear suckers, each inclosing a powerful hook, which is retractile, like



HOOKS OF A HOOK SQUID.

1, side view of a sucker, showing a half-concealed hook. 2, front view of same. 3, a fossil hook squid (*Acanthoteuthis speciosa*); impression of arms, traceable by the preserved hooks, in the slates of Eichstätt, Bavaria.

the claws of a cat. Hook squids are found in the Sargasso Sea, in the Polynesian seas, etc., and are much dreaded by swimmers and divers, as they are sometimes 6 feet or more long. See CEPHALOPODA.

HOOKWORM DISEASE. ANKYLOSTOMIASIS; UNCINARIASIS; EGYPTIAN CHLOROSIS; MINERS' ANÆMIA. This widespread disease is due to an intestinal parasite, uncinaria, two distinct species of which are generally recognized, viz., the Old World hookworm and the New World hookworm. The Old World variety is called *Anchylostoma duodenale*, and the American *Necator americanus* (Stiles) or *Uncinaria americana*. Generically identical but specifically distinct parasites are found in dogs, cats,

foxes, monkeys, and various other animals. In the American species the adult worm is from 7 to 11 millimeters long and possesses a dorsal and a ventral pair of strong, curved, ventral teeth, together with a pair of ventral lancets. The eggs closely resemble those of the Old World hookworm. Both parasites inhabit the small intestine, especially the jejunum and ileum, but also the duodenum and occasionally the stomach.

The eggs are laid in the intestine of the patient, are discharged with the feces, develop within 24 hours or more into a rhabditiform embryo which sheds its skin in 48 to 72 hours and again within 5 to 9 days. The worm is now the so-called "encysted larva" and has reached the infectious stage. From this time the worm takes no more food until it reaches its animal host. Infection of man takes place either through the skin or by way of the mouth. When through the skin, the larva, as experimentally demonstrated by Looss, penetrates through the skin to the circulatory system, passes with the blood through the heart to the lungs, thence to the air passages up to the larynx, from which point it gets into the alimentary canal through the œsophagus to the stomach and finally to the small intestine.

Studies of the geographical distribution of hookworm made through the agency of the Department of State show that the disease belts the earth in a zone about 68° wide, extending from parallel 36° N. to parallel 30° S. lat. Practically all countries in this latitude are infected. In six countries, viz., Wales, Germany, the Netherlands, Belgium, France, and Spain, the disease is confined to miners. In 46 foreign countries, aggregating a population of about 920,000,000, the disease is general and widespread. The total population of the infected States in the United States is about 20,000,000. Together these constitute 58 per cent of the earth's estimated population. The degree of infection varies; in American Samoa it is found in 70 per cent of the population; in the southern two-thirds of China, in 75 per cent of the population; while in India from 60 to 80 per cent of 300,000,000 population have the disease; in Ceylon, 90 per cent in many parts; in Natal, 50 per cent of the coolies on sugar and tea estates; in Egypt, 50 per cent of the laboring class; in Dutch Guiana, 90 per cent in many parts; in British Guiana, 50 per cent of all; in Colombia, 90 per cent of those living between sea level and 3000 feet, which includes most of the population; and until 1904, when the activities of the Hookworm Commission began, 90 per cent of the working population of Porto Rico were infected. The problem is thus seen to be not local, but world-wide, and, unless controlled, sanitarians believe that the disease will produce the same evil results in the United States that it has in other lands, such as India, China, and Egypt, where it has undermined the physical and mental health of the population, destroying economic efficiency and preventing social development.

In the United States hookworm disease has come to be a sanitary problem of considerable importance. According to the yearly reports of the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease, infection is widespread in the following 11 States: Alabama, Arkansas, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, and Virginia. Maps of the areas indicate that hookworm infection in these States

occurs in belts or zones, the heaviest showings being in eastern Virginia and the eastern part of North and South Carolina, in central Tennessee, in the southern half of Alabama and Georgia, and in the northeastern corner and southern half of Mississippi, following the sandy plain in the seaboard States. In 1913, 186,277 persons were treated for hookworm disease in these States, and for the four years during which the commission has been in action a total of 539,107 cases have been treated.

Hookworm disease occurs in all degrees of severity. If infection occurs in childhood, both mental and physical development are greatly retarded. In well-developed cases the skin is waxy white or dirty yellow, dry and parchment-like, and perspiration more or less suppressed. The mucous membranes are pale or even white, corresponding to the degree of anemia. The victims have an anxious, stupid expression with a fishlike stare. The body is apt to be emaciated, and the abdomen prominent (Edema of the face, feet, ankles, or the entire body may be present. There are generally digestive disturbances, with tenderness in the epigastric region as a marked symptom. Many individuals develop an abnormal appetite for sour articles, such as lemons or pickles, or for salt, coffee, and butter-milk, others have a perverted appetite for resin, charcoal, chalk, tobacco, ice, rotten wood, mud (dirt eaters), clay, sand, and even cloth garments and books. Stiles described one boy who had eaten three coats, thread by thread, within a year. The pulse is rapid, palpitation is constant, and dyspnea is very common among these patients. Examination of the blood shows varying degrees of anemia. The red cells are pale and become irregular in shape. The mortality average in the United States is unknown, but the Porto Rico Commission, according to Ashford, expressed the belief that 30 per cent of all the deaths in Porto Rico were due to uncinariasis. The treatment of the malady is very satisfactory, thymol, male fern, and beta-naphthol being the three principal drugs used. They are administered after the intestine has been emptied by a saline purge and must be given with great care. Eucalyptus oil and chloroform have also been given with success.

The prevention and control of hookworm in the South depend almost entirely upon sewage disposal, and the work of the Rockefeller Commission is largely concerned in teaching the people of these districts how to accomplish this end. Consult Stiles, *Report on the Prevalence and Geographic Distribution of Hookworm Disease in the United States* (Washington, 1903), id., *Hookworm Disease (or Ground-Fish Anemia): Its Nature, Treatment, and Prevention* (ib., 1910), id., *Hookworm Disease in its Relation to the Negro* (ib., 1909). The above pamphlets are issued by the United States Public Health Service. Consult also *Yearly Reports of the Rockefeller Sanitary Commission for the Eradication of Hookworm Disease*. See ANKYLOSTOMIASIS.

HOOLE, ELIJAH (1797-1872) An English Wesleyan clergyman and missionary. He went to India in 1819 and remained for 10 years. On his return to England he was appointed superintendent of schools for Ireland, in 1834 became assistant secretary of the Wesleyan Missionary Society, and in 1836 was made one of the general secretaries of the society and continued to serve until his death, a period of 38 years. He was the author of *Madras, Mysore, and the South of*

India (2d ed., London, 1844) *Yearbook of Missions* (ib., 1847), *Oglethorpe and the Wesleys in America* (ib., 1863), *Byron and the Wesleys* (ib., 1864).

HOOLE, JOHN (1727-1803) An English translator and dramatist, born in Moorfields, London. He had little education, was too near-sighted to become a watchmaker like his father, so entered the India House as a clerk (1744), was made auditor of Indian accounts, then principal auditor. He was a friend of John Scott of Amwell and wrote (1785) a life of him, and a friend also of Dr Johnson, whom he attended in his last illness. Hoole's works include: the translations, *Tasso's Jerusalem Delivered* (1763), versions of Metastasio's dramas, and Ariosto's *Orlando Furioso* (1783)—all severely criticized by Scott, Southey, and Lamb, three tragedies of his own acted at Covent Garden the life of Scott above mentioned and prefixed to Scott's *Critical Essays*, and a monody on *The Death of Mrs Woffington* (1760). His translations of Ariosto and Tasso, despite a certain stiffness and artificiality which contrast unfortunately with the fluent and melodious stanzas of the originals, have their fine qualities and still hold their own in succeeding editions.

HOOLOCK The white-browed gibbon (*Hylobates hoolock*) of northeastern India, where it leads an active life among the hill forests. It is frequently kept captive and proves a docile, cleanly, and interesting pet. The name is a native imitation of their whooping call, heard most frequently at sunrise. See GIBBON.

HOONAH, hōō'na, or HOONIAH, hōō'n'ya A native settlement on Icy Strait, Alaska (Map Alaska, M 6). It has a Presbyterian mission, and a government school with an enrollment of 111 in 1912. The inhabitants, numbering 452 in 1910, live largely through furnishing fish to the salmon cannery at that place.

HOONOOMAN, hōō'nōo-man The sacred monkey of India. A better spelling of the word is hanuman (q v).

HOOP ASH. See HACKBERRY.

HOOPER, FRANKLIN WILLIAM (1851-1914) An American institute director. Born at Walpole, N H, he studied at Antioch College (Ohio) in 1867-71 and graduated from Harvard University in 1875. He was principal of the Keene (N H) High School in 1877-80, taught natural science at Adelphi College, Brooklyn, in 1880-89, and thereafter was director of the Brooklyn Institute of Arts and Sciences. He was president of Antioch College in 1901-05 and trustee after 1899. He served as director of the Brooklyn Art Association after 1890 and of the Brooklyn Public Library from 1895 to 1904 and as a member of the Brooklyn Board of Education in 1892-99, and he also became trustee of the New York School of Agriculture, Long Island, in 1912 and of Adelphi College in 1913. He frequently lectured on biology and geology and was active in the organization of museums.

HOOPER, JOHN (c1495-1555) An English prelate and martyr. He was born in Somersetshire and educated at Oxford. He became a Cistercian monk and when the monasteries were dissolved went to London to live. He was converted to the Zwinglian form of Protestantism and, advocating his new views, had to flee to the Continent (1540) and spent some time in Switzerland under the influence of Bullinger. Some time after the accession of Edward VI he

returned to England (1549) and became a preacher in London. In 1550 he was appointed Bishop of Gloucester, but his objections to wearing the episcopal vestments caused delay and even imprisonment. In 1552 he received the bishopric of Worcester in *commendam*. On the commencement of Mary's reign in 1553 he was committed to the Fleet, where he remained for 18 months, being frequently examined before the Council, was condemned as a heretic, and burned at the stake at Gloucester, Feb. 9, 1555. He was the author of numerous sermons and controversial treatises, of which a collected edition appeared at Oxford (1855). The account of his death appears in John Foxe's *Acts and Monuments*, books x, xi (London, 1838).

HOOPER, JOHNSON J. (c.1815-63). An American humorist. He was born in North Carolina, removed early to Alabama, edited a newspaper and practiced law there, and was secretary of the Provisional Confederate Congress. In 1845 he published the *Adventures of Captain Simon Suggs*, broadly, crudely, and uncouthly humorous, yet one of the raciest books of its time, descriptive of a gambling sharp of the Southwest in the "flush times." His *Widow Rugby's Husband and Other Tales of Alabama* (1851) is less successful.

HOOPER, WILLIAM (1742-90). An American jurist and signer of the Declaration of Independence. Born in Boston, he graduated at Harvard in 1760. He studied law with James Otis and practiced very successfully in North Carolina, where he ably assisted the Provincial Government in suppressing the disturbances of 1770 and was elected to the Legislature in 1773. There he became a leader and, a year later, was elected to the Continental Congress, from which he resigned in 1777. In 1786 he was one of the Federal judges appointed to adjudicate the territorial dispute between Massachusetts and New York.

HOPESTON, hoo'p'ston. A city in Vermilion Co., Ill., 99 miles south of Chicago, on the Chicago and Eastern Illinois and the Lake Erie and Western railroads (Map: Illinois, J 5). It is the seat of Greer College, established in 1891, and has McFarren and other public parks and a Carnegie library. The city is in a fertile, agricultural region and manufactures chemicals, gas engines, cans and canning machinery, and canned goods, among its establishments being two of the largest sweet-corn canning factories in the United States. In 1877 Hoopston received a city charter, still in operation, which provides for a mayor, elected biennially, and a council. The water works are owned and operated by the municipality. Pop., 1900, 3823; 1910, 4698.

HOOPING COUGH. See WHOOPING COUGH.

HOOPOE, hoo'poo or hoo'pō (obsolete, *hoo-pop*, reduplication of *hoop*, Fr. *huppe*, OF.



HOOPOE.

huppe, *hupe*, from Lat. *upupa*, hoopoe). One of a small and singular group of birds of the warmer parts of the Old World, which take both

their common and systematic names (genus *Upupa*, family Upupidae) from their cry. In this family the bill is long and slender, the wings of moderate size or short, the legs short, the toes long, and the claws strong and curved. The common European hoopoe (*Upupa epops*) is an African bird, visiting in summer most parts of Europe and Asia, but rare in Great Britain. It is about the size of a blue jay; its plumage exhibits a fine mixture of white, buff, and black, and it has a large crest of two parallel rows of feathers. Its strange appearance and habits have caused it to figure largely in European legend and folklore. It gets its food chiefly on the ground, and one of the myths has it that its peculiar notes are made by striking the bill on the ground as the note is uttered. The nest is made in a hole in a tree or wall, and the eggs are white. The hoopoes were formerly thought to be related to the crows, but it is now generally admitted that their nearest relatives are the hornbills, although they are apparently so different. An extensive account of the curious and interesting traits of this bird is given in the *Royal Natural History*, vol. iv (London, 1895). See BIRD for other authorities. See Plate of TROGONS, HOOPOE, ETC.

Wood Hoopoe. The birds of the subfamily Iridopidae, which are found in South Africa, are nearly related apparently to the Upupidae and are known as wood hoopoes. They are arboreal, have a glossy blackish plumage, no crest, and a long graduated tail. They are said to be noisy and restless birds and to climb about on trees like woodpeckers. Like the true hoopoes, they emit at times a rather disagreeable odor.

HOOPS, HOOP SKIRT. See CRINOLINE.

HOOP SNAKE. A small snake (*Abaster erythrogrammus*) of the South Atlantic States, foolishly feared by the negroes, who say it will put its tail in its mouth, stiffen its body, and roll along like a hoop, aiming to let go of its sting-tipped tail and dart it into the first person it meets. Similar stories are told of a closely related species, the wampum snake (*Farancia abacura*), common in swampy ground in the South; and both are called horn snakes. In fact, both species are perfectly harmless and spend most of their time beneath the ground, burrowing deeply into the soil. The former is blue black above, marked with three red lines, and flesh-colored below, with black spots; while the latter is uniform bluish black above and banded with red on the abdomen.

HOORN, hōrn. A seaport of the Netherlands, in the Province of North Holland, situated on the Hoornherp, a bay of the Zuyder Zee, 25 miles northeast of Amsterdam (Map: Netherlands, D 2). It is a typical old Dutch town and has many quaint mediæval buildings, among them the Harbor Tower, St. John's Hospital, the mint, the weigh-house, the town hall, and the courthouse. Other notable edifices are the museum and the Groote Kerk (great church), the latter with a monument to Admiral Floriszoon. Hoorn was formerly one of the richest towns in Holland, the great nets for the herring fishery being employed here as early as 1416. It has now a considerable trade in dairy products and also some shipbuilding. The chief products are gold and silver work, canvas duck, tobacco, and lumber. Fishing is still followed. Hoorn is the birthplace of the navigator Willem Schouten, who named Cape Horn after his native town. Pop., 1899, 10,714; 1911, 11,244.

HOOSAC (hōō'sak) **RANGE** A spur of the Green Mountain Range in west Massachusetts, extending about 16 miles north and south on the east side of the Hoosic River valley and forming the dividing line between that valley and the Connecticut River valley (Map Massachusetts, A 2) About a mile southeast of North Adams the range, which here reaches an altitude of 2300 feet, is pierced (at an altitude of 745 feet) by the Hoosac Tunnel, about 5¼ miles long, built between 1855 and 1874 at a cost of about \$20,000,000, for part of which the State lent its credit The maximum altitude of the range, 2400 feet, is reached about a mile south of the tunnel. See **TUNNEL**

HOOSE, hōōz or hōōs A disease of sheep due to the presence of parasites (*Strongylus filaria* et al.) in the bronchial tubes It is characterized by a husky cough

HOOSIC RIVER. A river of Massachusetts, Vermont, and New York states It rises in the Berkshire Hills, Berkshire Co., Mass., flows nearly north to North Adams, and then northwest, crossing the southwest corner of Vermont, and emptying into the Hudson River about 15 miles north of Troy (Map Vermont, A 8)

HOOSICK FALLS. A village in Rensselaer Co., N. Y., on the Hoosic River, 27 miles northeast of Troy, on the Boston and Maine Railroad (Map New York, G 5) It has extensive manufactures of agricultural implements, cotton and woolen goods, shirts and collars, electric insulators, paper, and paper-making machinery Settled in 1688, Hoosick Falls was incorporated first in 1827 Under a charter of 1884, revised in 1890, the village is governed by a president, chosen every three years, and a board of trustees, elected from their respective wards The village owns its water works Pop., 1900, 5671, 1910, 5532 Hoosick Falls contains a large State park at the site of the British intrenchments at the battle of Bennington, Aug. 6, 1777.

HOOSIER (hōō'zhēr) **FROG.** See **MINK FROG**

HOOSIER SCHOOLMASTER, THE A novel by Edward Eggleston (1875), one of the first successful attempts to picture the rude surroundings of the pioneers of the Middle West

HOOSIER STATE Indiana See **STATES**, **POPULAR NAMES OF**

HOOVE, or **HO'VEN.** See **BLOAT**

HOP (from Dutch *hoppe*, Dutch *hop*, OHG *hopfo*, Ger *hopfen*, hop, of doubtful origin), *Humulus lupulus* A perennial plant which belongs to the Urticaceæ, or nettle family The single species, a native of America and England, where it is often found growing wild upon trees and shrubs, has given rise under cultivation to many varieties The hop is a dioecious climbing vine with rough stems and heart-shaped, three to seven lobed leaves. The pistillate flowers are the hop of commerce, used mainly in the manufacture of beer Hop culture is not general, like the culture of cereals, but is confined to certain areas, comparatively limited in extent, which on account of soil and climatic conditions are especially suited to the production of the crop The principal hop-producing regions of the United States are New York and the Pacific coast States Wisconsin also produces a small quantity In Europe the principal hop-growing countries are England, Austria-Hungary, Germany, France, and Belgium The hops from Kent in England and

from Saaz and Auscha in Bohemia have long been considered of the finest quality throughout the world In general, the hops are known in the European markets by the name of the locality in which they were grown This serves as an indication of their comparative quality and value

The hop may be grown on a variety of soils, but it always requires a well-drained subsoil It succeeds best on a moist, sandy loam Soil conditions are generally considered the most important factor in determining the quality of the crop In preparing land for hops it is plowed deeply and brought to a fine tilth The hop is propagated by cuttings made from the underground stems which the plant sends out near the surface of the ground These cuttings are made and set out in the spring In the United States one male plant is grown per hundred or so, but in Europe as a rule, only female plants are grown, as the presence of seeds in the hops injures the flavor of certain beers made from them The vines are either trained on poles or on wire trellises The latter method is gradually displacing the system of training on poles During the growing season the soil is cultivated to keep it mellow and retentive of moisture and for the purpose of killing the weeds Harvesting is done by hand and forms the hop grower's busy season, as the hop deteriorates when exposed too long to the weather after it is ripe The yield varies from 1000 to 3000 pounds per acre When the hops are harvested, they are immediately cured by air drying under cover or by drying in kilns constructed for that purpose The cured product is pressed into bales of about 200 pounds each and is shipped in this form to distant markets In Europe hops are generally shipped in large sacks without being baled The world's annual commercial production of hops averages about 200,000,000 pounds, of which the United States, generally the leading producing country, furnishes from 25 to 30 per cent Of the annual yield in the United



HOP

States New York and Washington produce each approximately 15 per cent, California 30 per cent, and Oregon 40 per cent.

The valuable principle of the hop is a yellowish aromatic, resinous substance called lupulin, which has been found to contain two preservative or soft resins (oleoresins) and a nonpre-

servative or hard resin. The preservative resins are the most valuable, since they are particularly unfavorable to the growth of lactic ferments, but not to the true yeast of beer. The deterioration of hops caused by exposure when mature, or by excessive drying, consists in the waste of the lupulin. For brewing, the hop must be well ripened, properly dried, and with the resin and other qualities unimpaired. Consult P. L. Simmonds, *Hops, Cultivation and Uses* (New York, 1877). Herbert Myrick, *The Hop: Its Culture and Cure* (ib., 1909), and publications of the United States Department of Agriculture.

HOP APHIS. See HOP LOUSE, HOP INSECTS.

HOPATCONG, LAKE. A picturesque body of water in Morris and Sussex Counties, N. J., 50 miles northwest of Newark (Map New Jersey, C 2). The lake is about $6\frac{1}{2}$ miles long, northwest by southeast, and generally narrow, though its shores are deeply indented by several bays, the largest of which makes its maximum width about 1 mile. It lies in a well-wooded fir and pine district, 928 feet above sea level. Its area is 2443 acres. The Musconetcong River drains it from the southwest into the Delaware, but it supplies water for the upper level of the Morris Canal, so that much of its drainage actually passes southeast into the Rockaway River. It is a popular summer resort.

HOPE. A city in Hempstead Co., Ark., 112 miles southwest of Little Rock, on the St. Louis, Iron Mountain, and Southern, the Louisiana and Arkansas, and the St. Louis and San Francisco railroads (Map Arkansas, B 4). It is in a productive cotton and fruit growing region and has compresses, cottonseed-oil mills, lumber, grist and planing mills, wagon works, cotton gins, and metal frame screen, box, spoke, stave, and handle factories. It is also an important shipping point for cotton, lumber, cattle, and hides. There are municipally owned water works, electric-light and sewage plants. Pop., 1900, 1644, 1910, 3639.

HOPE (afterward BERESFORD-HOPE), ALEXANDER JAMES BERESFORD (1820-87). An English politician and author, son of Thomas Hope and stepson of William Carr, Viscount Beresford. He was educated at Harrow and at Trinity College, Cambridge, served in Parliament for Maidstone from 1841 to 1852, was reelected in 1857, and from 1868 to his death represented Cambridge University. An independent Conservative, he opposed the abolition of Church rates, the legalization of marriage to one's deceased wife's sister, and, especially, the Reform Bill of 1867. In the debate on the last measure he broke lances with Disraeli, calling him the "Asian mystery," and getting recognition of his Dutch ancestry and poor delivery in Disraeli's allusion to "Batavian graces." A High Churchman and deeply devoted to the English church and to its control by the state, Hope bought, in 1844, St. Augustine's Abbey, Canterbury, as a missionary college, built All Saints' Church in London, and wrote on religious liberty, at the time of the excitement over Roman aggression, in the *Chronicle*, and later in the *Saturday Review*, being closely associated in both with John Douglas Cook. Hope was president of the Royal Institute of British Architects (1865-67), of the Architectural Museum and of the Ecclesiological Society. His publications include several works on Church politics, *The English*

Cathedrals of the Nineteenth Century (1861), *A Popular View of the American Civil War* (3d ed., 1861); and a successful novel, *Strictly Tied Up* (4th ed., 1886).

HOPE, ANTHONY. See HAWKINS ANTHONY HOPE.

HOPE, SIR JAMES (1808-81). A British admiral, born in Edinburgh. He was educated in the Royal Naval College, Portsmouth, and when 14 years old went as midshipman on a frigate bound for the West Indies. In 1827 he was promoted lieutenant and by 1830 had reached the rank of commander, having by that time made voyages to the Mediterranean and the East Indies. He saw service in North and South America (1833-45), and after opposing the Russians in the Baltic for two years was created rear admiral (1857) and commander of the Chinese squadron (1859-62). In 1859 he made a gallant attempt to enforce the ratification of a treaty the Peking government had entered into with France and England. He lost most of his ships and men and was himself severely wounded, but returned to the attack the following year and was successful (1860). From 1863 to 1867 he commanded in North American waters and the West Indies, and for three years (1869-72) was in charge at Portsmouth. He was made an admiral in 1870, chief naval aide-camp to Queen Victoria in 1873, and was retired in 1878, but was created honorary admiral of the entire fleet a year later.

HOPE, THOMAS (c. 1770-1831). An English author and virtuoso. He belonged to a rich family of merchants, Scottish by descent, who had settled in Amsterdam. While still a youth he traveled extensively in southern Europe and in the East and collected many drawings, chiefly of buildings and sculptures. After 1796 he made England his home. He was of assistance as a patron to Canova, Thorvaldsen, and Flaxman. He first attracted attention by the decorations which he bestowed on the interior of his mansion in Duchess Street, Portland Place, London, a description of which appears in his book *Household Furniture* (1807). In 1809 he published *Costumes of the Ancients and Architecture of Theatres*. Three years afterward appeared *Modern Costumes*, and in 1819 *Anastasis, or Memoirs of a Modern Greek at the Close of the Eighteenth Century*. Published anonymously, this last work was ascribed to Lord Byron, who said that he had wept because he did not write it. It is a brilliant romance describing adventures and manners in the East.

HOPE COLLEGE. A coeducational institution of learning at Holland, Mich. It was organized by Dutch colonists in 1857 as an academy and in 1866 was chartered as a college under the auspices of the Reformed church in America. The Western Theological Seminary was founded in 1869. In connection with the college is a preparatory school, which admits pupils who have completed the eighth grade in the public schools. Among the principal buildings of the college are Van Raalte Memorial Hall, the Carnegie Gymnasium, Graves Library, Winants Chapel, Maria L. Ackerman Hoyt Observatory, and two dormitories. The campus comprises 16 acres. The college provides five courses—classical, philosophical, natural science, modern-language English, and modern-language mathematics. There were, in 1914, 152 preparatory, 179 collegiate, and 29 theo-

logical students The faculty numbers about 25 The college had in 1914 an endowment of \$388,400 and an income of \$36,000 In the same year the library contained 22,000 volumes The degree of Bachelor of Arts is conferred In 1914 the president was Rev Ame Vennema, D D

HOPEDALE A town in Worcester Co, Mass, 74 miles southwest of Boston, on the Grafton and Upton Railway (Map Mass, D 4) The town contains the Bancroft Memorial Library and a bronze statue of Adin Ballou It has large manufacturing of cotton machinery Pop, 1910, 2188. Hopedale was founded as a religious community in 1841 by a society under the leadership of Rev Adin Ballou, in the town of Milford, Worcester Co, Mass The chief aim of the founder was to restore the original ideals of Christian life rather than to reorganize society economically A farm of 238 acres with mill sites was purchased by the society, organized as a joint-stock company. The community consisted of 28 persons, who observed strictly the rules of communism As the community increased in numbers, these rules were somewhat relaxed A board of trustees at first controlled the industries of the community, but later the several branches were farmed out to individuals The community was not a success financially, nor was social harmony long maintained In 1854 it had reached its highest point, embracing about 200 members Agriculture and several branches of manufacture were carried on Two years later the community was found to be deeply in debt, and the joint-stock company was dissolved As a purely religious organization, it continued to exist for some years, but in 1867 merged in the Hopedale Unitarian Parish, with Mr Ballou as minister, the industries founded by the society being carried on by private management Hopedale was incorporated as a town in 1886 Consult Adin Ballou, *History of the Hopedale Community* (Lowell, 1897)

HOPE DIAMOND A large blue diamond in the possession of Mrs E E McLean, of Washington, D C, and weighing $44\frac{1}{4}$ carats It is supposed to have been cut from a stone purchased from Tavernier by Louis XIV, which weighed uncut $112\frac{1}{2}$ carats and $67\frac{1}{2}$ carats after cutting The stone was lost in 1792 and came into the market in 1890, when it was bought by Thomas Henry Hope, the English banker whose daughter married the Duke of Newcastle It went into the market again in 1901, and finally in 1909 was purchased for Mrs McLean for the sum of \$180,000 Legend has been busy with the history of this diamond, and tales of ill luck to its possessor, while eagerly told, are without foundation in fact

HOPE-JONES, ROBERT (1841-1914) An Anglo-American organ builder He early applied himself to the study of electricity, became chief electrician of the English telephone companies, and was a member of the British Institution of Electrical Engineers An accomplished organist himself, and a member of the Royal College of Organists, he turned his attention to the application of electricity to organ building and produced instruments which took leading rank among their kind Hope-Jones organs have been installed in Germany, England (notably Worcester Cathedral), France, India, Australia, New Zealand, and the United States (notably Ocean Grove, N J, auditorium) In 1903 Hope-Jones came to America and built organ factories at Elmira, N Y, and later at

North Tonawanda, N Y the latter of which was sold to the Rudolph Wulitzer Company in 1914 He made Buffalo his home In September 1914, he committed suicide

HOPE THEATRE, THE A sixteenth-century bear garden, on the Bankside, Southwark, London, which was changed into a playhouse in 1581 It was restored to its former use at the Restoration, but towards the end of the seventeenth century gradually lost its popularity

HOPFEN, hō'f'en, HANS VON (1835-1904) A German novelist and poet, born and educated at Munich, where he was associated with the Munich school of poets, especially with Geibel In 1866 he moved to Berlin, where he devoted himself to literature, having already contributed to the *Munchener Dichterbuch* (1862) and written the novel *Peccetia* (1864) *Der Pinsel Mings* (1868), a satirical tale in verse, a book of essays, *Streitfragen und Erinnerungen* (1876), a volume entitled *Theater* (1889), the plays *Aschenbrotel in Bohmen* (1870) *In der Molk* (1889), the *Neues Theater* (1892-93), the tragedy *Gotin der Vernunft* (1892), the drama *Helga* (1892) and the comedy *Es hat so sollen sein* (1893), comprise his best dramatic and miscellaneous work The remainder of his writings include a score of novels and collections of stories—in which he did his best work—of which the following may be mentioned *Verdorben zu Paris* (2d ed, 1892), *Die Heuat des Herrn von Waldenberg* (2d ed, 1884), *Der alte Praktikant* (3d ed, 1891), *Die Geschichten des Majors* (3d ed, 1882), *Neue Geschichten des Majors* (1890), *Im Schlaf geschenkt* (4th ed, 1896), *Zehn oder elf* (1901), and *Gotthard Lingens Fahrt nach dem Glück* (1902) Consult Muncker, in *Westermanns Monatshefte*, vol lxx (Brunswick, 1886), and P Lindau, *Gesammelte Aufsätze* (Berlin, 1880).

HOP FLY See HOP LOUSE

HOP HORN'BEAM. See HORNBEAM

HOPHTHALMOS See HAUG J C F

HOPI, hō'p'e, or MOKI, mō'ke An interesting Pueblo tribe of Shoshonean stock, occupying seven villages upon three mesas in north central Arizona and numbering about 1900, including those of Tewa or Hano The principal villages are Walpi and Oraibi In many respects the Hopi may be considered the most interesting of Pueblo tribes They are all mesa dwellers, and their villages, situated hundreds of feet above the surrounding desert, are only to be reached by steep, adventurous trails They hold fast to their old aboriginal culture, which is of the typical Pueblo character, but better preserved than that along the Rio Grande Their ceremonies are elaborately conducted, particularly those of the 'new fire' and the various "katsina," or 'masked dances,' also the celebrated snake dance in which the performers carry living rattlesnakes in their mouths as they dance They are industrious farmers and have always in their granaries abundant stores of corn, beans, and pumpkins They also weave baskets and blankets and are skillful potters and wood carvers (See Colored Plates in articles BASKET and BLANKET) The clan system is rigid and highly developed among them According to explicit traditions, the ancestors of these tribes were builders of many of the ancient ruins in the surrounding region The people of the small village of Hano are of different language, originally being emigrants from a Tanoan pueblo in the Rio Grande

valley who left their eastern home shortly before 1700. Consult: B. I. Gilman, *Hop Songs* (New York, 1908), numerous articles in *Annual Reports of Bureau of Ethnology*, Washington, and *Anthropological Publications of Field Museum*, Chicago. See SNAKE DANCE.

HOP INSECTS. The most destructive insect enemy of the hop crop is the hop aphid. Other species are of less importance, but they sometimes do considerable damage to the plant. The hop grub or hop-plant borer (*Gortyna immanis*) is the larva of a noctuid moth which lays its eggs in the early part of the season upon the young shoots of the plant. The young caterpillars, which are slender and greenish in color spotted with black, bore into the vine just below the tip and remain at this point for some time. The head turns downward and stops growing. Such vines are called muffled heads or stag vines, and sometimes bullheads, the caterpillar at this time being called tip worm. A little later it drops to the ground and enters the stem at the surface of the ground. It is then called the collar worm, changing to a white color with black spots. About the end of July it becomes full-grown and transforms to pupa near the roots of the plant. The moth issues in the fall or in the spring.

A number of different caterpillars feed upon the foliage. The hop-vine snout moth (*Hyppena humuli*) is one of the principal forms. The larvae of two butterflies (*Polygonia interrogationis* and *Polygonia comma*) feed quite abundantly upon this plant and are known to hop growers as hop merchants, from the gold and silver markings upon the chrysalids. The zebra caterpillar (larva of *Mamestra picta*), the common woolly-bear caterpillar (larva of *Spilosoma virginica*), and the saddle-back caterpillar (larva of *Empetia stimulea*) are the remaining principal species. One of the leaf hoppers (*Tettigonia confluenta*) causes more or less damage to the foliage, and the striped flea beetle (*Phyllotreta vittata*) also damages the leaves, while the so-called red spider or spinning mite (*Tetranychus telarius*) often causes the leaves to turn yellow. The best remedy for all of these insects consists in spraying at the proper time, using an arsenical spray for the caterpillars and the flea beetle, a kerosene emulsion for the leaf hoppers, and a sulphur wash for the spinning mite. Consult L. O. Howard, "Pests of the Hop Crop," in *The Hop Industry* (New York, 1898). See HOP LOUSE.

HOPKEN, hēp'kēn, ANDERS JOHAN, COUNT VON (1712-89). A Swedish statesman. He became a leader of the Hat party, obtained a seat in the national Diet, and was one of the two commissioners who negotiated with Russia in 1741-42. In 1746 he became a senator and in 1751 accepted the premiership of Sweden. He lost his offices in the political turmoil of 1761, but in the following year was made Count, and in 1772 reentered the Senate. He is author of several biographies. Carl Silfverstolpe published a selection of his writings under the title *Grefve Hopkens Skrifter* (2 vols, 1890-93).

HOPKINS, ALBERT (1807-72). An American scientist, brother of Mark Hopkins. In 1826 he graduated from Williams College, where subsequently he was tutor (1827-29), and professor of mathematics and natural philosophy (1829-38), of natural philosophy and astronomy (1838-68), and of astronomy (1868-72). He

had charge of a scientific expedition to Nova Scotia in 1835, and two years later he directed the building of an astronomical observatory at Williams.

HOPKINS, CYRIL GEORGE (1866-) An American chemist and agronomist, born near Chatfield, Minn. He was educated at the South Dakota Agricultural College (B.S., 1890), at Cornell University (M.S., 1894, Ph.D., 1898), and at Göttingen (1899-1900). After filling several less important positions he was chemist at the University of Illinois Agricultural Experiment Station from 1894 to 1900, thereafter professor of agronomy and chief in agronomy and chemistry, and after 1903 vice director. He invented Hopkins's condenser and Hopkins's distilling tube. He was president of the Association of Official Agricultural Chemists for the year 1905-06. His publications include, besides bulletins and articles *Soil Fertility and Permanent Agriculture* (1910), *The Story of the Soil* (1911), *The Farm that won't Wear out* (1913).

HOPKINS, EDWARD (1600-57). A Colonial Governor of Connecticut, born at Shrewsbury, England. After being a tradesman in London for a few years, he came to Boston in 1637 and settled at Hartford. He was chosen Governor of the Colony of Connecticut several times during the period 1640-54. After that he lived in London. He assisted in forming the Union of the New England Colonies in 1643. He left £1000 to support grammar schools in Hartford and New Haven. With the sum of £500 left for "public ends," Harvard College, to which it was turned over, bought a township from the "praying Indians" and named it Hopkinton.

HOPKINS, EDWARD WASHBURN (1857-). An American Sanskrit scholar and philologist, born at Northampton, Mass. He graduated at Columbia College in 1878 and after studying in Germany was professor of Greek, Sanskrit, and comparative philology at Bryn Mawr College, Pennsylvania, from 1885 to 1895. In the latter year he was called to Yale University as professor of comparative philology and Sanskrit, to fill the chair left vacant by the death of Whitney. He wrote several important books connected with India. *Mutual Relations of the Four Castes according to the Manavadharma-gastram* (1881), *The Ordinances of Manu, translated from the Sanskrit* (1884), *Religions of India* (1895), *The Great Epic of India* (1901), *India Old and New* (1901), and numerous contributions to the *Journal of the American Oriental Society* and other periodical publications.

HOPKINS, ESEK (1718-1802). An American naval officer, born in Scituate, R. I. In the Revolutionary War he was at first a brigadier general in the army, but in 1775 Congress commissioned him commander in chief of the new American navy. Washington officially addressed him as admiral. He went to sea in February, 1776, with four ships and three sloops, and took the forts at New Providence, with all the guns, ammunition, and stores. On his return he seized a British schooner and a bomb brig. His later operations were less fortunate, and in January, 1777, he was dismissed from the service because he let the *Glasgow* get away from him and failed to appear before Congress when so ordered. He was afterward prominent in Rhode Island political affairs, for many years as a member of the General Assembly. Consult Field, *Esek Hopkins, Commander-in-Chief of the*

Continental Navy during the American Revolution, 1775-78 (Providence, 1898)

HOPKINS, EZEKIEL (1634-90) Bishop of Londonderry. He was born at Pinne, Devonshire, Dec. 3, 1634. His early education was conducted under Presbyterian and independent influences. He graduated B.A. at Oxford (1653) and became chaplain of Magdalen College (1656). In 1662 he conformed and was presented to the living of St. Mary Woolnoth in London. When the great plague broke out in the capital (1666), Hopkins withdrew to Exeter, where he obtained the living of St. Mary's. When Lord Robartes was made Lord Lieutenant of Ireland (1669), Hopkins went with him to Dublin and through his influence obtained the deanery of Raphoe (1670) and in 1671 the bishopric of Raphoe. In 1681 he was made Bishop of Londonderry. In the course of the siege of the town by the Irish adherents of James II, in 1689, Hopkins withdrew from the town and retired first to Raphoe and afterward to London, where he was made rector of St. Mary, Aldermanbury (1689). This charge he held until his death, June 19, 1690. His works, which have been frequently republished, comprise *Sermons, Expositions of the Decalogue and the Lord's Prayer*, and elaborate discourses on *Regeneration* and *The Vanity of the World*. The best edition of his collected works is by Pratt (4 vols., London, 1809).

HOPKINS, HENRY (1837-1908) An American Congregational clergyman and college president, son of Mark Hopkins. He was born at Williamstown, Mass., graduated from Williams College in 1858, and studied at Union Theological Seminary in 1859-60. He entered the Congregational ministry in 1861 and served as an army chaplain at Alexandria, Va., in 1861-64. Thereafter he held pastorates at Westfield, Mass., in 1866-70, and at Kansas City, Mo., until 1902, when he was chosen president of Williams College. This office he held until shortly before his death.

HOPKINS, JOHN CASTELL (1864-). A Canadian editor and author. He was born of English parentage in Dyersville, Iowa, and was educated at Bowmanville, Ontario, whither his family had removed. For some years he was a banker in Toronto, then he was a member of the editorial staff of the *Toronto Daily Empire*, and later he devoted himself to political writing for reviews and magazines, on phases of Canadian progress and British imperialism, and to biographical work and the compiling and editing of works of reference. He edited *Canada: an Encyclopædia of the Country* (6 vols., 1897-1900) and in 1902 founded and became the editor of *The Canadian Annual Review of Public Affairs*. In 1914 he was elected a fellow of the Royal Geographical Society. In addition to the works already mentioned he published *Life and Work of Sir John Thompson* (1895), *Life and Work of Mr. Gladstone* (1895); *The Story of the Dominion* (1899), *History of South Africa* (1900), *Life of King Edward VII* (1910), *French Canada and the St. Lawrence* (1913), and other works.

HOPKINS, JOHN HENRY (1792-1868). A Protestant Episcopal bishop. He was born in Dublin, Ireland, Jan. 30, 1792, came to the United States in 1801, and became an iron manufacturer in Pennsylvania. The War of 1812 having proved disastrous to the business, he studied law, and began practice in Pittsburgh,

but in 1823 he entered the ministry of the Protestant Episcopal church, in response to the call of the church in which he was vestryman. In 1831 he accepted the charge of Trinity Church, Boston, and the next year was chosen Bishop of Vermont, taking also the rectorship of a church in Burlington. He took great interest in education and made heavy pecuniary sacrifices for its promotion. After 1856 he devoted his whole time to the care of the diocese. He was a prolific writer, leaving nearly 20 published works, among which are *Christianity Vindicated* (1833), *The Primitive Creed Examined and Explained* (1834), *The Novelties which Disturb our Peace* (1844), *History of the Confessional* (1850), *The American Citizen His Rights and Duties* (1857), *A Scriptural, Ecclesiastical, and Historical View of Slavery* (1864). He was prominent in the Lambeth Conference in London in 1867. He died at Rock Point, Vt., Jan. 9, 1868. Consult his biography by his son JOHN HENRY (New York, 1873).

HOPKINS, JOHNS (1795-1873) An American financier and philanthropist. He was born of Quaker parentage in Anne Arundel Co., Md., where he lived on a farm until he was 17, when he went to Baltimore and worked for a time in his uncle's grocery. Afterward he became a merchant, with wide connections in Maryland, Virginia, and North Carolina. His credit and counsel were highly valued in financial and mercantile affairs, and he became one of the leading financial men in Baltimore. His services to the Baltimore and Ohio Railroad were of great value. Towards the end of his life, having no children, he determined to devote his fortune to the service of the public. Accordingly he founded and endowed two great institutions which perpetuate his name—Johns Hopkins University and Johns Hopkins Hospital. Johns Hopkins Medical School, founded in 1893, is part of the university and closely allied with the hospital. The total gift for these two purposes was more than \$7,000,000.

HOPKINS, LEMUEL (1750-1801). An American political poet, born in Connecticut. He practiced medicine at Litchfield and after 1784 in Hartford, where he became allied with the "Hartford Wits," Joel Barlow, John Trumbull, David Humphreys, Theodore Dwight, and others, and with them wrote *The Political Greenhouse*, *The Echo*, and—advocating strong Federal government—*The Anarchiad* (republished at Hartford, 1861). Hopkins also wrote *The Hypocrite's Hope* and *The Victim of a Cancer Quack*.

HOPKINS, MARK (1802-87) An American educator, grandnephew of the theologian Samuel Hopkins, and brother of the astronomer Albert Hopkins. He was born at Stockbridge, Mass., graduated at Williams College in 1824, was tutor there for two years, and, after studying medicine and practicing for a short time in New York, became professor of moral philosophy in Williams in 1830 and president of the institution in 1836. He resigned this position in 1872, but remained pastor of the college church and incumbent of the chair of moral philosophy. In 1857 he had become president of the American Board of Foreign Missions. Undoubtedly one of the greatest of American educators of his day, Hopkins did much to build up the prestige of Williams College and much more to develop the individual student. He was a powerful preacher and a successful lecturer. He pub-

lished *The Influence of the Gospel in Liberalizing the Mind* (1831), *The Connection between Taste and Morals* (1841) his Lowell Lectures, *The Evidences of Christianity* (3d ed., 1875), *Miscellaneous Essays and Reviews* (1847), a second series of Lowell Lectures, *Moral Science* (1802), *The Law of Love and Love as a Law* (last ed., 1881); *An Outline Study of Man* (last ed., 1893), *Strength and Beauty* (1874, in 1884 under the title *Teachings and Counsels*), *The Scriptural Idea of Man* (1883)

HOPKINS, SAMUEL (1721-1803) An American clergyman and founder of the Hopkinsian theology. He was born at Waterbury, Conn., Sept. 17, 1721. Having graduated at Yale College in 1741, he studied theology with Jonathan Edwards in Northampton, Mass., and from 1743 to 1769 was pastor of Housatonic, now called Great Barrington, Mass. He then removed to Newport, where he died Dec. 20, 1803. His writings consist of a life of Jonathan Edwards, sermons, addresses, a work on the millennium, and a system of theology, republished in Boston, 1852. He was remarkable for his simplicity, earnestness, and persevering industry. He held most of the Calvinistic doctrines, even in their most extreme form, but entirely rejected the doctrine of imputation, both the imputation of Adam's sin and of Christ's righteousness. The fundamental doctrine of the Hopkinsian system, based on Edwards' theory of virtue as "love to being," is that all virtue and true holiness consists in disinterested benevolence, and that all sin is selfishness. The self-love which leads a man to give his first regard even to his own eternal interests is sinful, so that one ought to be willing "to be damned for the glory of God." Consult his collected writings with memoir by E. A. Park (Boston, 1852), and Foster, *History of New England Theology* (Chicago, 1907).

HOPKINS, STEPHEN (1707-85). A Colonial Governor of Rhode Island and one of the signers of the Declaration of Independence. He was born in Providence, R. I., and was descended from an old English family, his great-grandfather, Thomas Hopkins, having settled in Providence about 1638. Stephen's early life was spent on a farm, and he had little opportunity to gain an education, though under the tutelage of his grandfather and uncle he learned surveying and later broadened his intellectual horizon by extensive reading. In 1732 he began his active participation in public affairs by becoming clerk of the newly constituted township of Scituate, a position which he continued to hold for 10 years. From 1732 to 1738 (excepting the year 1734) he was a representative from Scituate to the General Assembly, and upon being returned in 1741 he was chosen Speaker. He became a justice of the Court of Common Pleas in 1736 and was appointed its clerk in 1741. Six years later he was made assistant justice of the Superior Court at Newport and in 1751 Chief Justice. He was one of the Rhode Island delegates to the Albany Convention of 1754 and was a member of the committee which was appointed to draw up a "plan of union" (See ALBANY CONVENTION). In 1755 he was elected Governor of Rhode Island and was eight times reelected, serving almost continuously until 1768, when he withdrew finally from the gubernatorial contest. Meanwhile he had acquired large shipping and commercial interests, and in 1764, in answer to the proposal of Parliament to tax the Colonies, he sent to the As-

sembly a forceful tract, *The Rights of Colonies Examined*, which was forthwith published in Rhode Island and reprinted in nearly every other continental English colony. After acting as chairman of several Colonial committees, he was a member of the General Assembly from 1770 to 1775. In 1772, when the commander of the *Gaspee* was by arbitrary measures invoking that hostility which expressed itself in the burning of the schooner, Hopkins, as Chief Justice of the Superior Court, held "that no commander of any vessel has a right to use any authority in the body of the Colony, without previously applying to the Governor, and showing his warrant for so doing", and when it was proposed to send to England for trial persons charged with the burning, he declared that he would neither apprehend by his own order nor suffer any executive officers in the Colony to do so for that purpose. In 1774 Hopkins framed a bill to prohibit the importation of slaves and from 1774 to 1780 was one of Rhode Island's representatives in the Continental Congress, being one of the signers of the Declaration of Independence in 1776. He was also a member of the Rhode Island Council of War and a delegate to numerous New England conventions. He died in Providence, July 13, 1785. He wrote *A True Representation of the Plan Formed at Albany for Uniting all the British North American Colonies* (1755) and *An Historical Account of the Planting and Growth of Providence* (originally published in the *Providence Gazette* in 1762 and 1765), which, though a fragment, is of considerable value. It has been republished in the *Collections of the Massachusetts Historical Society*, vol. ix (2d series, Boston, 1822), and in the *Collections of the Rhode Island Historical Society*, vol. vii (Providence, 1885). Consult Foster, *Stephen Hopkins, a Rhode Island Statesman* (ib., 1884, forming nos. 19 and 20 of the Rhode Island Historical Tracts).

HOPKINS, WILLIAM (1793-1866). An English geologist and mathematician, born at Kingston-on-Soar, Nottinghamshire. Graduating B.A. in 1827 and M.A. in 1830 from St. Peter's College, Cambridge, he early distinguished himself as a teacher of mathematics. After 1833 he devoted much time to the application of mathematics to physical geology, as in the motion of glaciers, transport of erratic blocks, and in earth movements producing faults and fissures. In 1850 he received the Wollaston medal. He served as president of the Geological Society in 1851 and of the British Association for the Advancement of Science in 1853. He published *Elements of Trigonometry* (1833) and various important papers on geology.

HOPKINS, WILLIAM JOHN (1863-) An American author. He was born at Bedford, Mass., and was educated at the Friends' Academy, at Harvard University, and at Massachusetts Institute of Technology. He early published *Telephone Lines and their Properties* (1893) and *Preparatory Physics* (1894), but he came to be known as a writer of stories. His books include *The Sandman Series* (4 vols., 1902-08), *The Airship Dragonfly* (1906), *The Clammer* (1906), *Old Harbor* (1909), *The Meddlings of Eve* (1910); *The Indian Book* (1911); *Concerning Sally* (1912), *Burbury Stoke* (1914), *The Doers* (1914).

HOPKINSIANISM. See HOPKINS, SAMUEL. **HOPKINSON, FRANCIS** (1737-91). An

American politician, jurist, and miscellaneous writer, born in Philadelphia, Pa. He is best remembered for his *Battle of the Kegs* (1778), a humorous ballad based on an incident in the Revolutionary War. He was educated at the College of Philadelphia, admitted to the bar in 1761, and a few years later he spent a year in England, where his cousin was then Bishop of Worcester. Returning to Philadelphia, he practiced law, was active in learned societies, declared his republican sympathies, and, having removed to New Jersey, was made delegate to the Continental Congress (1776). He took part in drafting the Articles of Confederation and signed the Declaration of Independence. He held various offices under the Federal government, was Judge of Admiralty for Pennsylvania (1779-89), suffered an impeachment which failed, and was district judge there (1790-91). Hopkinson was a man of exceptionally varied accomplishments. He composed music for his facile songs, painted, was a dilettante in popular science, a humorist, and a political pamphleteer. His works were collected in three volumes (Philadelphia, 1792). Besides the *Battle of the Kegs*, his most popular production was a short prose allegory of the relations between the Colonies and the mother country, entitled *A Pretty Story* (1774). He was father of Joseph Hopkinson (qv). Consult A. R. Marble, *Heralds of American Literature* (Chicago, 1907).

HOPKINSON, JOHN (1849-98). An English physicist and electrical engineer. He was born at Manchester, England, and received his education at Owens College, Manchester, and at Trinity College, Cambridge, where he graduated with honors in 1871 and was appointed fellow and tutor. Commencing practical engineering, he soon became interested in electrical engineering and was led to many important investigations. He was made a fellow of the Royal Society of London in 1878, and in 1890 was awarded by it a royal medal for researches in electricity and magnetism. He was at the time of his death a member of the Councils of the Institutes of Civil and Mechanical Engineers and professor of electrical engineering in King's College, London. Among his most important researches are those in which he showed the effect of temperature upon the magnetic properties of various metals. He was an authority in the theory and practice of dynamo-electric machinery and discovered the method of employing the so-called "characteristic curve" in discussing such problems. This curve is obtained by taking the electromotive forces as ordinates and the current as abscissas and serves for the dynamo the same purpose as the indicative diagram in the case of the steam engine. He was the author of *Dynamic Electricity* (1884), *Original Papers in Dynamo Machinery and Allied Subjects* (1893), and many papers on various electrical and engineering subjects, which, with a memoir by his son, were collected and published in 1901. With one son and two daughters he was killed in an accident while climbing the Alps.

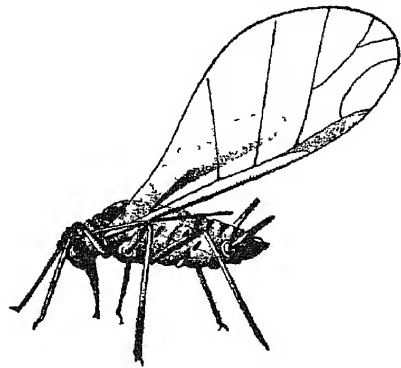
HOPKINSON, JOSEPH (1770-1842). An American jurist, born in Philadelphia, Pa. He graduated at the University of Pennsylvania in 1786 and in 1791 began the practice of law at Easton, Pa., but soon removed to Philadelphia, where he rose to the front rank in his profession. He was the leading counsel in the famous suit of *Rush v. Cobbett* in 1799 and de-

fended Judge Chase in his impeachment before the Senate in 1800. From 1815 to 1819 he served as a Federalist Representative in Congress, where he distinguished himself in the debates on the tariff and the Seminole War and strongly opposed the rechartering of the United States Bank. In 1828 he was appointed by President Adams a district judge, an office which he held until his death. For several years he was president of the Philadelphia Academy of Fine Arts and vice president of the American Philosophical Society, to each of which he contributed many papers of interest. In 1837 he was a member of the Pennsylvania Constitutional Convention and served as chairman of its Judiciary Committee. His legal essays and decisions were long accepted as authoritative, but he will be longest remembered for his national song, "Hail Columbia," written in 1798, which attained immediate popularity and did much to fortify waving patriotism.

HOPKINSVILLE. A city and the county seat of Christian Co., Ky., 71 miles northwest of Nashville, Tenn., on the Louisville and Nashville, the Tennessee Central, and the Illinois Central railroads (Map Kentucky, C 6). It is the seat of McLean College, Bethel Female College (Baptist), founded in 1854, and of the Western Kentucky Asylum for the Insane, and contains a Carnegie library, Odd Fellows Home, Peace and Latham parks, and a fine post office, city hall, and courthouse building. The city is engaged principally in tobacco manufacture and trade, but has a considerable business also in flour, wheat, corn, hay, dairy products, and live stock. Hopkinsville was settled in 1797, incorporated in 1798, and adopted the commission form of government in 1914. Pop., 1900, 7280, 1910, 9419, 1914 (U. S. est.), 10,328.

HOPLOPHONEUS (Neo-Lat., from Gk *ὅπλα*, *hopla*, arms + *φόνιος*, *phonios*, murderous). A Miocene fossil cat, found in the White River formation of Colorado, Wyoming, and the Dakotas. See **SABRE-TOOTHED TIGER**.

HOP LOUSE. A very destructive aphid or plant louse (*Phorodon humuli*), found commonly

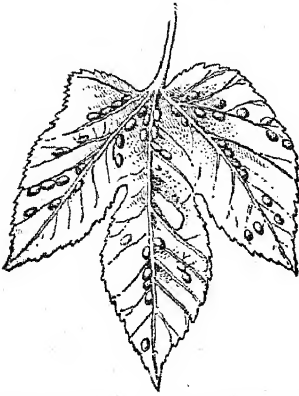


WINGED MIGRANT, THIRD GENERATION

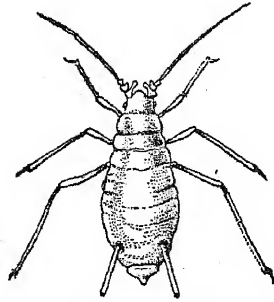
on the hop plant and called in England hop fly. In certain years this insect causes an almost total loss of the hop crop in parts of England and New York and a number of years ago forced the abandonment of this industry in Wisconsin. About 1890 it made its first appearance in the States of Oregon and Washington and has since done great damage. The winter eggs are laid on plum trees in the neighborhood of the hopyards

These eggs hatch in the spring at the time when the buds are about to burst, and three genera-

The tenth or eleventh generation is winged, flies back to the plum, and gives birth to true sexual females which are wingless, but which mate with winged males which fly in from the fields. The winter egg is then laid once more upon the plum twigs. (See ALTERNATION OF GENERA-



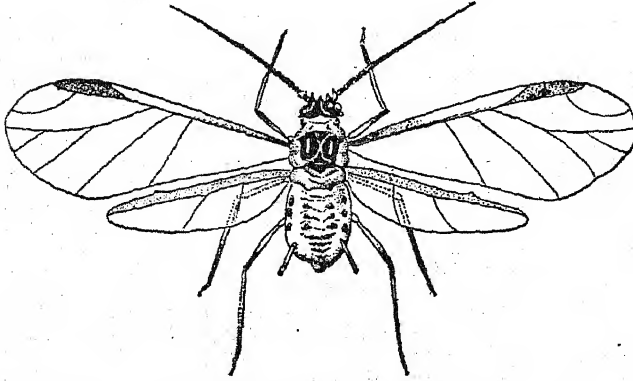
HOP LEAF, WITH LICE; NATURAL SIZE.



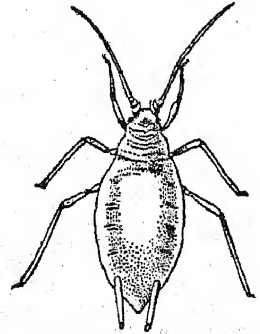
FOURTH GENERATION; FIRST ON THE HOP.

tions of wingless, parthenogenetic females are born upon the plum trees. Then a fourth gen-

ERATIONS; APHID.) The best remedy for this injurious creature is to cut down all but one or



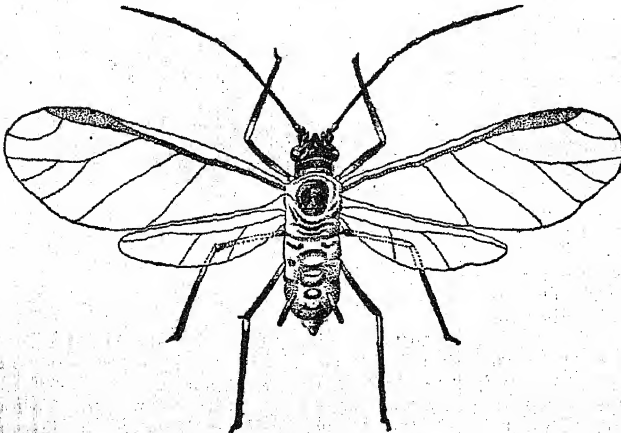
WINGED RETURN MIGRANT, OR PUFIGER.



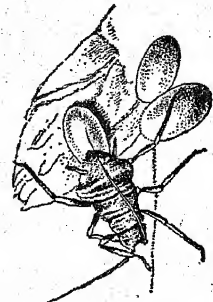
NORMAL PARTHENOGENETIC FEMALE; SIXTH GENERATION.

eration, consisting of winged agamic females, makes its appearance. These females fly to the hop fields and establish themselves there, giving

two of the plum trees near the hopyard and then to destroy in May all of the lice on the one or two remaining trees by spraying with a



WINGED MALE, AT END OF SUMMER.



SHRUNKEN FEMALE IN ACT OF DEPOSITING WINTER EGGS.

birth to living young which, agamic and wingless, give birth to individuals like themselves.

dilute kerosene-soap emulsion or a fish-oil soap wash. See HOP INSECTS.

HOP O' MY THUMB The diminutive hero of a popular fairy tale, taken from Perrault's *Contes des fées*, the popular sources of which are the classic stories of Ulysses and Polyphemus and of Theseus and Ariadne.

HOPPER, DE WOLF (1858-) An American comedian, born in New York City. He first appeared on the stage in 1878 in *Our Boys*, and he first starred in *Castles in the Air* in 1890. Subsequently he played leading rôles in *Wang* (1891), *Panjandrum* (1893), *Dr. Syntax* (1894), *El Capitán* (1895) in which he made his first appearance in London in 1899, *The Charlatan* (1898), *Happyland*, *Mr. Pickwick*. After 1900 he took part in revivals of *Wang* and *Panjandrum*, appeared in the title rôle of *The Pied Piper* (1908), toured and played in New York in *A Matinee Idol* (1909-10). For several years he starred in his own company. Later he joined the Gilbert and Sullivan Opera Company, which from 1911 to 1913 was responsible for a notable revival of *Pinafore*, *Patience*, *The Mikado*, *The Pirates of Penzance*, *Iolanthe*, and Millocker's *The Beggar Student*. Of this company, which included many "stars," Hopper was perhaps the leading figure. In such parts as those of Dick Deadeye and Ko-Ko his ability to realize the comic possibilities approached genius.

HOPPER, ISAAC TATEM (1771-1852). An American philanthropist, prominent in the anti-slavery movement. He was born in Deptford Township, Gloucester Co., New Jersey, Dec. 3, 1771. At 16 years of age he was apprenticed to an uncle in Philadelphia to learn the trade of a tailor. In early manhood he became an active and leading member of the Pennsylvania Abolition Society, founded by Franklin, Rush, and others, and was also an overseer of a school for colored children, secretary of a society for the employment of the poor, inspector of a prison, guardian of abused apprentices, and a friend of the insane. He belonged to the Society of Friends, and in the division which occurred in 1827-28 he acted with those who were called Hicksites, influenced much, no doubt, by his great regard and admiration for Elias Hicks as an earnest antislavery preacher, in 1829 he went to New York to take charge of the bookstore opened by the Hicksite Friends. His activity in opposition to slavery exposed him to much abuse and even imperiled his life, but this did not in the least abate his zeal. In 1841 he gave up the charge of the bookstore and was appointed treasurer and office agent of the American Antislavery Society, and so continued until 1845, when he became the first agent of the New York Prison Association. Declining years and ill health compelled his resignation in February, 1852. He died in New York, May 7, 1852. Consult his life by L. M. Child (New York, 1881).

HOPPER, NORA (Mrs. W. H. Chesson) (1871-1906). An Irish poet of that group of Irish writers who collectively constituted the movement known as the Irish Literary Revival. (See *IRISH LITERATURE, in English*.) Her *Balads in Prose* (1894) made an immediate impression. Her verse is characterized by the delicacy of sentiment, grace, wistfulness, and intensity which belong to the Celtic temperament. She published in addition to the book named, *Under Quicken Boughs* (1896), *Songs of the Morning* (1900), and *Father Felix's Chronicles* (1907). *Selected Poems* (1906) con-

tains, besides her verses, an introduction by F. M. Hueffer and a biographical note by her husband, W. H. Chesson, who edits the book.

HOPPE-SEYLER, hop'pe-zi'ler, FELIX (1825-95). A German physiologist and chemist, born at Freyburg-on-the-Unstrut and educated at Halle, Leipzig, Berlin, Prague, and Vienna in medicine and natural history. After five years as assistant to Virchow and director of the chemical laboratory of the Berlin Pathological Institute, he became professor of applied chemistry at Tübingen (1861) and (1872) of physiological chemistry at Strassburg. He wrote *Handbuch der physiologisch- und pathologisch-chemischen Analyse* (7th ed., 1902), *Medizinisch-chemische Untersuchungen* (1866-71), *Physiologische Chemie* (1877-81). Consult Baumann and Kossel, *Zur Erinnerung an Felix Hoppe-Seyler* (Strassburg, 1895).

HOPPIN, AUGUSTUS (1828-96). An American book illustrator, born in Providence, R. I. He graduated at Brown University in 1848 and was admitted to the bar, but soon gave up the law and went abroad to study art. Upon his return he devoted himself to drawing on wood and to the illustration of books, in which he was successful. His pictures in *Nothing to Wear* (1857), *Potiphar Papers* (1853), and *The Autocrat of the Breakfast Table* are widely known. He published several volumes of sketches and novels, among the latter *Recollections of Aunt House* (1881) and *Married for Fun* (1885).

HOPPIN, JAMES MASON (1820-1906). An American educator and writer. He was born at Providence, R. I., graduated at Yale in 1840, at Harvard Law School in 1842, and at Andover Theological Seminary in 1845, studied for some time abroad, and was pastor of a Congregational church at Salem, Mass., from 1850 to 1859. From 1861 to 1879 he was professor of homiletics at Yale, where he was also professor of the history of art from 1879 to 1899, when he became professor emeritus. Among his publications are *Old England: Its Art, Scenery, and People* (1867), *The Office and Work of the Christian Ministry* (1869), *Life of Rear-Admiral Andrew Hull Foote* (1874), *The Early Renaissance and Other Essays on Art Subjects* (1892), *Greek Art on Greek Soil* (1897); *The Reading of Shakespeare* (1904).

HOPPNER, JOHN (1758-1810). An English portrait painter. He was born in London, April 4, 1758. His mother was one of the German court attendants. Her husband is said to have accompanied George II to England as physician to the household and as such to have lived at St. James's. At any rate, young Hoppner was brought up there, was a choir boy in the Chapel Royal, and was given an annuity by George III in 1775 to enable him to study at the Royal Academy. It was generally believed that he was the natural son of the King. Hoppner's marriage to an American girl, Miss Phœbe Wright, in 1781, is said to have cost him the King's favor and to have been the cause of his receiving notice to "quit his apartments in Buckingham House, with the intimation that his bills would be paid up to a certain date." After losing the King's favor he apparently ranged himself definitely with the Prince of Wales on the side of the Whigs as against the Tories. In 1791 his rival Lawrence was made principal painter in ordinary to the King, and Hoppner was appointed portrait painter to the Prince of Wales in 1793 and elected member of the Royal

Academy in 1795. As a result of the Prince's patronage, many of Hoppner's finest portraits are in the state rooms of St James's Palace, among them "The Prince," the "Duke and Duchess of York," "Lord Rodney," and "Lord Nelson." Paintings by Hoppner in the Metropolitan Museum, New York are "Lady with the Coral Necklace" and "Mrs Bache" (See BACHE, SARAH). In the Morgan collection loaned to the Metropolitan Museum is one of Hoppner's finest pictures, that of the three Godsal children, engraved in mezzotint by J Young in 1790 with the title "The Setting Sun." In the National Gallery, London, is the portrait of the beautiful Countess of Oxford, friend of Lord Byron. In the National Portrait Gallery, London, are "Baron Colchester," "Baron Grenville," "William Pitt," "William Smith." While Hoppner was a pupil and an avowed follower of Reynolds, he had a marked personality of his own, and his portraits of women and children are distinguished for sentiment and poetical warmth. His portraits of men, with the exception of Lord Nelson and a few others, are colder and less intimate. For many years his work was neglected, but to-day the best of it stands beside that of Reynolds, Gainsborough, Romney, and Lawrence. Those of his pictures that are still in good condition show that his reputation as a brilliant colorist was deserved. Noteworthy is his use of luminous golden browns, as in the portrait of the Godsal children. While his drawing was seldom accurate, he had a knack for modeling in paint and getting a lifelike effect. But he was apt to flatter his subjects by eliminating or modifying facial blemishes, and most of his women have the romantic interest that is aroused by an appearance of gentle melancholy. Consult J C Van Dyke, *Old English Masters* (New York, 1902), McKay and Roberts, *John Hoppner, R.A.* (London, 1909), an exhaustive folio volume elaborately illustrated, with catalogue raisonné, W McKay, *Works of John Hoppner* (New York, 1914).

HOP TREE (*Ptelea trifoliata*). An American shrub of the rue family, called also shrubby trefoil, wafer ash, and wingspeed, which grows in rocky places from New York and Ontario to Minnesota and southward. It usually grows from 6 to 10 feet in height, but when well trimmed and cultivated sometimes attains a height of 30 feet or more. The leaves are trifoliate, the leaflets pointed, and downy when young, the flowers, which grow in terminal cymes, are greenish white and have a disagreeable odor. The fruit has a broad wing which resembles that of the elm and is very bitter, but does not possess the aromatic and bitter principle of the hop. nevertheless, it is said to have been used as a substitute for hops in making beer. The bark and root are of some repute in medicine. When dried, the bark has a peculiar, somewhat aromatic smell and a bitter, pungent, acrid taste. The bark contains an acrid, bitter oleoresin, starch, albumin, a yellow coloring substance, and salts of lime, potash, and iron, also the alkaloid berberine, probably the tonic principle.

HOPWOOD, SIR FRANCIS JOHN STEPHENS (1860-). An English administrator. He was educated at Louth, was admitted a solicitor in 1882, became assistant law clerk (1885) and assistant solicitor (1888) to the Board of Trade, and, after serving a year as private secretary to the President of the Board of Trade, in 1893

was made Secretary to the Railway Department. He was British delegate to the International Railway congresses of 1895 and 1900, was sent on important missions to Canada and the United States, and served on royal commissions—on shipping rings, London traffic, canals, electoral reform, etc. In 1901-07 he was Permanent Secretary of the Board of Trade and then Under-secretary of State for the Colonies. In 1911 he was named "additional civil lord" on the Board of Admiralty, a nonpolitical appointment in an attempt to reorganize the board, and in 1912 he became Privy Councillor. He was knighted in 1901.

HOQUIAM, hō'kwi-am. A city in Chehalis Co., Wash., on Gray's harbor, 90 miles by rail southwest of Tacoma, on the Chicago, Milwaukee, and St. Paul, the Northern Pacific, and the Oregon-Washington Railroad and Navigation Company systems (Map Washington, A 3). It is surrounded by timberlands, has a fine harbor, and is an important shipping point for lumber products, salmon, canned sea clams, and furs. The chief industrial establishments are shipyards and large lumber and shingle mills. Hoquiam has a Carnegie library and a fine high-school building. It adopted the commission form of government in 1911. Pop., 1900, 2608, 1910, 8171, 1914 (U. S. est.), 10,540.

HOR, hōr. A mountain where, according to one tradition, Aaron (q.v.) died (Num. xx, 22 ff., xxiii, 38 f., Deut. xxxiv, 50). Josephus (*Ant.*, iv, 4, 7) and Eusebius (*Onom.*, 303, 144) located this mountain at Petia, northwest of Wadi Musa, where a peak bears to-day the name of Jebel Harun (mount of Aaron). There is a structure on the top of the mountain within which is a sarcophagus covered with black cloth. One of the sides is partly exposed, and there is a Hebrew inscription in square characters on the marble slab. The tomb is not older than the Moslem possession. But the sanctuary is evidently old, and there is no reason to doubt that it was ascribed to Aaron long before the time of Josephus. Schmidt has suggested that the figure of Aaron was connected with this mountain even before David's conquest of Edom, and that another centre of his veneration was Moserah (Jebel Madhera) in the Negeb, where he also is said to have died (See AARON). There is no mountain by the name of Hor in the Lebanon Range. The Greek version shows that Hor in Num. xxxiv, 7 is simply caused by ditto-graphy. Consult Schmidt, in *Hibbert Journal* (London, 1908), id., "Kadesh Barnea," in *Journal of Biblical Literature* (Boston, 1900), Musil, *Arabia Petrea, I. Edom* (Vienna, 1906), Dalman, *Petra und seine Heiligtümer* (Leipzig, 1911).

HORA, hō'ra, hō'ra (c. 1740-85). A Ruman patriot and national hero of Transylvania, sometimes called *Nikla Urss*, Nicholas the Bear. With Juon Kloska and George Kriszán, he roused the people to rebellion against the Imperial order for general conscription (1784). The uprising spread until 30,000 men had joined. But Imperial troops were hurried in in such numbers that the revolt failed; the three leaders were captured, and Hora was killed. Hora's exploits form the theme of popular Ruman songs.

HORACE, ō'ras'. A five-act tragedy in verse, by Pierre Corneille, produced in 1640. It is founded on the old Roman legend of the Horatii and Curiatii.

HORACE, hō'ras (QUINTUS HORATIUS FLAC-CUS) (65-8 B.C.) A Latin poet, born at Venusia, on the borders of Lucania and Apulia. His early years were thus passed amid a picturesque environment of mountain, forest, and stream, which made a deep impression upon his mind and strengthened that love of nature which so often finds expression in his verse. To the men and the women of Apulia, also, he ascribes all the characteristic Italian (Roman) virtues. Horace's father was a *coactor*, a collector of taxes or of money due for goods sold at public auctions, and by his thrift was successful not only in buying his own freedom, but also in acquiring a small estate and an income which enabled him to give to his son the best education Rome itself could offer. Thither, at an early age, Horace went with his father, who in his affection and devotion to his son's interests made himself the boy's comrade in the daily round of study and play and helped to form his son's standards of life and conduct by his own shrewd comments upon men and manners. It was naturally the *mos maiorum* rather than any abstract ideal of which the freedman pointed out the advantages, but the familiar talks had their desired effect in the rise in Horace's mind of an instinctive aversion to excess of every sort, and trained him, besides, in habits of keen observation and pointed though kindly criticism. It was then customary among young Romans of birth and means to complete their education by what may be called a university course in the schools of philosophy at Athens or in those of oratory at Rhodes, and so, between 18 and 20, Horace took up his residence at Athens, listened to the exposition of conflicting philosophical theories, and entered into the social life of his fellow students. Purely speculative problems attracted him as little as they did the average Roman, nor had he, in fact, much relish for the technicalities of any philosophical system. The paradoxes and social eccentricities of the Stoic thinkers, e.g., long made it difficult for him to do justice to the real moral elevation of their essential principles. But he had already become profoundly interested in the practical problem of how to order one's life aright, and his stay at Athens confirmed this taste for ethical inquiry. At this time, too, he must have come to know more intimately the work of Alcæus (qv), Sappho (qv), Archilochus (qv), and the other Greek lyric poets who were to be his models in the *Epodes* and the *Odes*.

But these peaceful and congenial pursuits were suddenly interrupted by the news of the assassination of Cæsar in March, 44, and the subsequent arrival of Brutus in Athens to secure recruits for the republican cause. Brutus, himself a lover of letters and an eager student of philosophy, was received with enthusiasm and was so much taken with Horace's promise that the latter, despite his youth and lack both of family connection and of military experience, was made a staff officer and ultimately served in the campaign of Philippi as *tribunus militum*. That decisive defeat and the suicide of his chief seem to have convinced him of the futility of further effort in the republican cause, and he made his way back to Rome, where, finding that his father's estate had been confiscated, he obtained employment as a clerk in the quaestor's office. It was the darkest period of his life, and, as the earliest of the *Epodes* show, the bitterness of his feeling found unrestrained ex-

pression in the verses which, in his own words, poverty drove him to write. But he was so fortunate as to win the regard of Vergil and Varius, who two or three years after his return to Italy, introduced him to Mæcenas. Nine months after the first interview Mæcenas again sent for the young writer and bestowed upon him the friendship that saved Horace for poetry.

But it was in metrical prose rather than imaginative poetry, as he himself viewed his work, that Horace first tried to gain an audience. Early training and the mood of the moment combined to make the choice of satire almost inevitable. Lucilius (qv), a member of the Scipionic circle, had for the first time in Latin literature used the old *melange* form of Ennius (qv) as a vehicle for witty and often stinging criticism of the political and the social life of his time. The range of topics was naturally exceedingly wide, the treatment often dramatic and cast in the dialogue form, the metres varied, though in the end the hexameter decidedly predominated. The new *satira* (see SATIRE) was marked by at least one original and noteworthy feature. This was the establishment of a personal and intimate relation between Lucilius and his reader, so that the frankest revelation of the poet's inmost feelings seemed yet free from egotism and consistent with self-respect. It was thus natural that Horace should be strongly attracted by Lucilius, though, with a mind already much occupied with the niceties of phrase and cadence, he could not but feel that, despite all its vigor and charm, the work of the older poet was sadly lacking in artistic finish. To write in the manner of Lucilius, but with a more perfect art, was the end Horace proposed to himself and achieved in the *Satires* (*Sermones*, "*causætes*," as he calls them), of which the first volume, containing 10 pieces, appeared about 35 B.C. The second, containing eight pieces, published about 29 B.C., is far superior in execution to the first and shows Horace at his best in this kind of writing. In reading this volume we are listening to an accomplished man of the world, intimately acquainted with human nature, whose whims and weaknesses he probes with delightful humor. He is exceedingly fond of the weapon of irony, which he uses against himself quite as often as against others, and every page reflects his sunny nature, genuinely tolerant and charitable. These "talks," however light in their touch, have yet a definite and serious purpose. It is the art of living that is ever under discussion, and, as he studied others, so also Horace studied most minutely the nature best known to him (his own), so that one of the special charms of the *Satires* is the presence of this constant self-analysis. Of egotism in the sense of vanity or selfishness Horace was of all men the most devoid, but he was nevertheless a watchful and ever interested observer of the motions of his own mind. He saw himself as he saw everything else (to borrow the words of Mr. Andrew Lang), with the lucidity of genius, and loved to put himself on terms of confidence with his readers.

One notices already in the *Satires* an attitude of mind that became characteristic and was later both to limit his range and to widen his appeal as a lyric poet. He takes counsel of his head rather than of his heart and distrusts enthusiasm, especially about ideas, as if warmth of feeling, not held carefully in check by reason,

rendered impossible that equipose through which alone one may hope to see things as they really are. This is true of even his friendships, where he is tenderness and loyalty itself. But this studied moderation of thought and utterance is the fruit of experience and self-discipline. His earliest attempts in lyric verse show all the ardent temper of youth and are marked by an exuberance of phrase in striking contrast with the wonderful compression of his later work. In these *iambi*, as he called them, published about 30 B.C., Archilochus (qv) is his model, though not more than half of the 17 poems that Horace deemed worthy of preservation show the personal animosity associated with the name of the Greek poet. With one exception, the seventeenth, they are written in couplets, the second verse of which forms a refrain (*epodus*, *ἐπωδός*) to the first, and thus they came in time to be known as *Epodes*. (See *EPODE*.) Immature as they are as a whole, and interesting chiefly as the first lyric essays of the Horace of the *Odes*, three certainly reveal poetical power of no mean order—the idyllic second, with its sudden turn to satire at the close, the fifth, with its extraordinary picture of the sorceress Canidia, and the sixteenth, with its passionate appeal to his countrymen to forego civil strife.

Shortly after the appearance of the first book of the *Satires*, Mæcenas presented Horace with a small farm among the Sabine hills, in the valley through which the cool Digentia flows south to join the Anio near the market town of Varia, the modern Vico-Varo. Perhaps no gift ever exercised a more important influence upon a man's career. It was not merely that he was thus enabled to devote himself wholly to his art without thought of pecuniary return. The farm was his *ars*, his sure retreat from the fatigues and distractions of the great world. The peace of nature, loved since the days of Venusia, entered into and possessed his soul, and the pure air—it was about 2000 feet above the sea—renewed his physical strength, of which, as the years passed, he had to take increasing care. He has immortalized the farm and, indeed, the whole valley in his affectionate praise. One may doubt whether he could have been happy without active participation in the brilliant life of the capital, but much of what is truest and best in the inspiration of the *Odes* and the *Epistles* is due to the many quiet days spent with his books in *Sabinis*. Excavations made in 1912-13 have settled, Italian archaeologists claim, the site of this Sabine farm. The results of these excavations have not yet, however, been officially and fully set forth to the world, for partial accounts, subject to correction later by the official publication, consult Haight, *The Classical Weekly*, vii, 85-86 (New York, 1914).

The 88 lyrics that are comprised in the first three books of the *Odes* were undoubtedly privately circulated among his friends previous to their final collection and publication in one little volume in the year 23. Their composition extended over about seven years, for the earliest that can be dated with certainty (i, 37) was written upon the receipt at Rome of the news of Cleopatra's suicide, and few, if any, could have preceded this. They were the outcome of long and loving study of the great Greek lyric poets, especially Alcæus and Sappho, of the early Greek classical period rather than of the Alexandrian age. But, while their form is similar to that of the Greek lyric poets, their content is vitally

different in its effect, and it is difficult to define precisely the nature of that unfailing charm which almost from the moment of their appearance they have been universally felt to possess. Shelley, in his *Defence of Poetry*, following a famous passage in Plato's *Phædrus*, and Sidney, in his *Apologie for Poetry*, both maintained that "poets are so beloved of the gods that whatsoever they write proceeds of a divine fury." But nothing could be more alien to Horace's temper than this. He has neither the passion of Burns or Catullus in the expression of feeling, nor the absorbed and ecstatic earnestness of Lucretius in urging the claims of the true philosophy of life, nor yet the imaginative and mystical power of Vergil. Gray, however, a poet whose method of composition resembled Horace's in its critical deliberateness—in the second poem of the fourth book of *Odes* Horace compares himself to a bee that with infinite labor gathers its sweets from many a flower—says in one of his letters "Extreme conciseness of expression, yet pure, perspicuous, and musical, is one of the grand beauties of lyric poetry." The three adjectives here used are peculiarly appropriate to Horace's work, indeed, no other lyric poet in Latin literature has so exquisite a verbal technique. The *Odes* abound in phrases of such perfect finish that no change save for the worse seems possible, phrases which have been the common property of educated men for centuries. *Persicos odi, puer, apparatus; carpe diem, dulce et decorum est pro patria mori, vivere fortes ante Agamemnona, matre pulchra filia pulchrior, nil desperandum, splendide mendax, dulce est desipere in loco, post equitem sedet atra cura*—to give a complete list would be almost to quote the *Odes* entire. Yet it is all a *curiosa felicitas verborum*, as Petronius (qv) aptly described it, the effects are carefully and minutely wrought out by a mind trained in the nicest apprehension of the color values of words and an ear attuned to all the subtleties of cadence. And no artist was ever more alive to the delicate shades of meaning that words gain from their context. Partly, no doubt, from the difficulties inherent in the use of foreign metres, but more especially because of his own liking for moderation and simplicity, the vocabulary which he has chosen to employ is notably limited. Yet the oft-recurring words produce so different an effect in their ever-changing settings that one does not notice the repetition. The themes themselves are even more limited in their range than the vocabulary, but upon the few that he selects he plays variations of surpassing beauty. There is nothing transcendental, nothing of what Poe held to be the essence of poetry, "no mere appreciation of the beauty before us, but a wild effort to reach the beauty above." The *Odes* are rather the expression of idealized common sense, and just for this reason Horace has been in all ages the favorite poet of minds the most diverse, for none makes a surer appeal to the finer sensibilities of humanity in its everyday moods. In a word, he speaks to the world of subjects which the world fully understands, in words and forms of surpassing beauty.

In the *envoi* to the first three books of the *Odes* (iii, 30), Horace expresses his entire confidence in their abiding fame, and with this achievement his lyrical impulse seems to have satisfied itself. A new series of "talks" engaged his attention, cast, however, in a different literary form, that of the letter. These *Epistles*, of

which the first book appeared towards the end of 20, or, at the latest, in 19, do not differ much from the *Satires* in the subjects discussed. Conduct is more than ever "three-fourths of life." But the years of reading and reflection have brought truer insight and greater breadth of view. He is still a searcher after the philosophy of life (his mind was far too independent to accept any creed formulated by others), but he urges with tactful insistence the elementary principles of whose truth he has become convinced. The humor is kindlier and more subtle; in fact, one is often in doubt whether he is speaking in jest or earnest, so that he has the inexhaustible charm of one whose secret is never wholly surprised. He is no idealist; it is rather the doctrine of the mean, the *aurea mediocritas*, that he so winningly inculcates. Not even virtue itself is to be sought beyond the bounds of reason, as indeed Aristotle had claimed long before him. Both the language and the metre of the *Epistles* show the effects of the seven years devoted to lyric composition. There is the same wealth of terse and happy phrase, and the hexameter, which even in the *Satires* was an immense advance upon the rhythm of Lucilius, is always smooth and often musical.

The death of Vergil in 19 left Horace by general consent the greatest living poet, and it was as such that in 17 Augustus commissioned him to write the hymn for the religious festival of the Secular Games (q.v.). The result to modern ears may seem rather stiff and unimaginative in spite of the technical excellence of the verse, but to the great Roman audience—we must remember that the *Carmen Sæculare* (q.v.) was chanted in the open air—there must have been something peculiarly impressive in the linking of the old liturgical formulas with the new faith in the city's Imperial destiny. Two years later, at the personal request of the Emperor, he composed two odes in celebration of the victories of Drusus (see *Drusus*, 3) and Tiberius (q.v.), the stepsons of Augustus, over the Rhæti and Vindelici, and, about the same time, two others in praise of the beneficent results for Italy of Augustus' reign. But Horace, though he had long been a sincere supporter of the new régime, was ill fitted for work of this kind, and these poems, especially the first two, show the laboriousness that not infrequently attaches to the official odes of a poet laureate. To give them permanence, he added 11 fugitive pieces (one of which, however, the seventh, on spring, is a perfect gem), and published this fourth book of the *Odes* in 13.

According to Suetonius, the charming bit of literary criticism which opens the second book of the *Epistles* was written to meet a complaint of Augustus that to him alone Horace had dedicated nothing. It is in substance an attempt to show that no true parallel could be drawn between the development of poetry in Greece and that at Rome, and that the work of the modern school, of which he regarded Vergil, Varius, and himself as the best representatives, marked the highest level yet reached of artistic achievement. (On the struggle between the new and the old in Latin literature, consult Knapp, "Archaism in Aulus Gellius," in *Classical Studies in Honor of Henry Drisler*, 135 ff., New York, 1894.) In the second of the two epistles of this book he sets forth at length with characteristic irony and indirection the reasons why henceforth lyric poetry must give place to the

"rhythms and harmonies of real life." The latest of his letters and the one which is most nearly a formal essay is that addressed to the Pisos. It is generally known as the *Art of Poetry* (*Libri de Arte Poetica*), though this title seems not to have been given to it by Horace himself, and is, indeed, scarcely appropriate, for only one branch, the drama, receives any systematic treatment. The discussion has all the sanity and breadth of judgment that mark the moral epistles, and is in effect another defense of the poetic ideals of the Augustan school.

Of the details of the closing years of his life we have no record. The death of Mæcenas, who in his last words commended his lifelong friend to Augustus was a severe shock. Horace, who had once (*Carmina*, ii, 17) prayed that they might not be separated in death, did not long survive him, dying on the 27th of November, 8 B.C. He was buried on the Esquiline, close to the tomb of Mæcenas.

Mr Mackail (*Latin Literature*, 118-119) has admirably summed up the significance of Horace's work: "Among the many amazing achievements of the Greek genius in the field of human thought were a lyrical poetry of unexampled beauty, a refined critical faculty, and, later than the great thinkers and outside of the strict schools, a temperate philosophy such as we see afterward in the beautiful personality of Plutarch. In all these three Horace interpreted Greece to the world, while adding that peculiarly Roman urbanity—the spirit at once of the grown man as distinguished from children of the man of the world, and of the gentleman—which up till now has been a dominant ideal over the thought and life of Europe."

Bibliography. The *editio princeps* was published at Venice in 1470. The most important editions before Bentley were those of Lambinus (last ed., Coblenz 1829), Cruquius (Antwerp, 1578), and Heinsius (Leyden, 1612). Richard Bentley's edition, first published at Cambridge in 1711 (3d ed., Berlin, 1860), made a new era in Horatian criticism. The best critical edition of the text is that of Keller and Holder (2 vols., Leipzig, 1864-70). Keller issued a second edition of the first volume (*Odes, Epodes, and Carmen Sæculare*) in 1899 and also a supplementary volume of text discussion, *Epilegomena zu Horaz* (Leipzig, 1879-80). The best general editions are those of Orelli revised by Hirschfelder and Mewes (4th ed., 2 vols., Berlin, 1886-92, with Latin notes and complete word index), Kiessling (2d ed., 3 vols., ib., 1890-97, vol. 1, the *Odes*, in 5th ed., 1908, vol. 11, the *Satires*, in 4th ed., 1910), Müller, *Odes and Epodes* (Leipzig, 1900), *Satires and Epistles* (1891-93), Wickham, *Odes and Epodes* (3d ed., Oxford, 1896), *Satires and Epistles* (1891); Schutz (Berlin, 1880-83, vol. 1, containing *Odes and Epodes*, 3d ed., 1889). The *Odes* have been edited separately by Nauck (13th ed., Leipzig, 1889), Page (4th ed., London, 1890), Smith (Boston, 1895, 1903), Shorey (ib., 1898, 1910), Bennett (ib., 1901), Moore (New York, 1902), the *Satires* by Kruger (14th ed., Leipzig, 1897), Palmer (4th ed., London, 1891), Rolfe (Boston, 1901), Morris (New York, 1909), the *Epistles* by Wilkins (3d ed., London, 1889), Morris (New York, 1911). Porphyrio's *Scholæ* have been edited by Holder (Innsbruck, 1894), those of the Pseudo-Acron by O. Keller (2 vols., Leipzig, 1902-04).

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HORÆ (Lat., hours, from Gk. ὥραι, *Hōrai*, seasons). In ancient Greece, goddesses of the seasons of the year, at first with special reference to the farmer. At Athens they seem to have been originally two, Thallo and Carpo, the goddesses of the blossoming and of the ripening fruit. In general they were at first three, Eunomia, Dike, Eirene (Good Order, Justice, Peace), whose names show that the ethical side of their nature, as guardians of the due order and peaceful succession of natural processes, has become prominent. In the legend they are daughters of Zeus and Themis, guardians of the gates of Olympus, attendants upon the gods. They bring flowers and fruits to mortals and are closely connected with the Charites (qv) or Graces. In the Hellenistic time the Horæ became more closely connected with the seasons, and now the number is increased to four, to each of whom are given attributes appropriate to a special season. These four Horæ, however, rarely appear in literature until the late epic of Quintus Smyrnaeus and Nonnus. The fiction of 12 Horæ for the hours of the day is also very late and cannot be found in art with any certainty. Consult: Rapp, in Roscher, *Lexikon der griechischen und römischen Mythologie* (Leipzig, 1886 et seq.), Preller-Robert, *Griechische Mythologie*, vol. I (Berlin, 1894), Jolles, in Pauly-Wissowa, *Real-Encyclopädie der classischen Altertumswissenschaft*, vol. VIII (Stuttgart, 1913). See HOURS, BOOK OF.

HOR/APOLLO, or **HOR/APOLLON** (Lat., from Gk. Ὑραπόλλων, *Horapollōn*). An Egyp-

tian who wrote on Greek grammar, probably in the fourth century A.D. He lived in Alexandria and at Constantinople and wrote commentaries on the Greek poets Sophocles, Alcæus, and Homer. Another Horapollon lived at the close of the next century. It is uncertain whether we should ascribe to the former or to the latter the extant work on hieroglyphics, in two books, professedly a Greek translation of the work in Egyptian of one Horapollon, or possibly Horus, which has some value to the Egyptologist. There are editions of the work on hieroglyphics by Leemans (Amsterdam, 1835), and by A. T. Cary, with English translation and notes (London, 1840).

HORATII, hō-rā'shī-i. According to Roman legend three Roman brothers, born at one birth, cousins to the Curiati, of Alba Longa, also three brothers born at one time. Their mothers were twins who had been married on the same day and gave birth to their sons at the same time. During the Roman wars, when Clulius, the Alban King, and Tullus Hostilius, the Roman King, were in conflict, it was decided to leave the issue to a personal combat between these brothers. Two of the Horatii were soon slain, and the third brother, feigning flight, was pursued by the Curiati, all wounded, whom he slew one by one. The sister of the Horatii was betrothed to one of the Curiati and had made for him a beautiful mantle. As the victor entered the gate of Rome bearing his spoils, he was met by his sister, who, upon recognizing the cloak in her brother's hands, broke out in lamentations. Enraged that she should prefer her lover to her country, her brother slew her on the spot, and her body remained unburied until passers-by covered it with stones. Horatius was condemned to be scourged to death, but was afterward pardoned. The story is given by Livy (I, 24-26); behind the pure myth lies the fact of the close union in early times between Rome and Alba Longa and the later subjection of Alba Longa.

The famous Horatius (Cocles), who, with Titus Herminius and Spurius Lartius, in 507 B.C., so gallantly defended the Sublucian bridge against the army of Lars Porsenna (qv), King of Clusium, while their companions broke down the bridge behind them, was a worthy descendant of the survivor of the three Horatii. Consult Pais, *Ancient Legends of Roman History* (Eng. trans., Chicago, 1906).

HORATIUS COCLES, hō-rā'shī-ūs kō'klēz. See COCLES, HORATIUS, HORATII.

HÖRDE, hēr'de. A town of the Prussian Province of Westphalia, situated on the Emsche, 2 miles by rail from Dortmund (Map Germany, B 3). In the vicinity are productive iron and coal mines, and the town has important iron and steel works, foundries and coke ovens, employing over 8000 men. Pop., 1900, 25,126, 1910, 32,791.

HORDEIN, hōr'dē-in (from Lat. *hordeum*, barley). A substance that can be extracted from barley. It is a mixture of starch, cellulose, and a little nitrogenous matter.

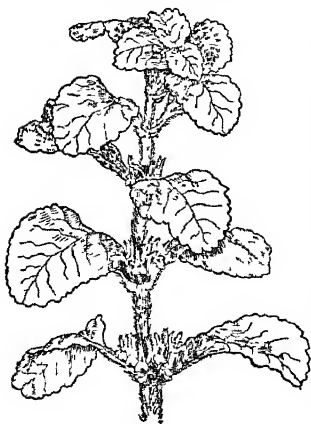
HORDEOLUM. See STYE.

HORDEUM. See BARLEY.

HOREB, hō'rēb. See SINAI.

HOREHOUND (AS *hār'hūne*, from *hār*, hoar + *hūne*, hoarhound), *Marrubium*. A genus of plants of the mint family. The species are mostly herbaceous perennials, natives of the south of Europe and the East. One species, the

common or white horehound (*Marrubium vulgare*), is found generally throughout Europe, except in the more northern regions, and in the United States, growing in waste places, waysides, etc. It is about 1 to 1½ feet high, bushy, with roundish, ovate, crenate, wrinkled leaves and whorls of white flowers. The whole plant has a whitish appearance, from the down with which its leaves are covered. It has an aromatic but not very agreeable smell. It is tonic, stimulant, and laxative, and is popularly and efficaciously used for



HOREHOUND.

coughs, as an infusion as a sirup with sugar, or as a candy. In England the name 'horehound' is applied also to another plant, *Ballota nigra*, sometimes called black or fetid horehound, also of the family Labiata, and of a genus very closely allied to *Marrubium*. It closely resembles the white horehound in taste and possesses similar medical properties. A third British plant, *Lycopus europaeus*, a plant of the same family, is sometimes called water horehound and is also known as gypsywort. All these species have been introduced in the United States, and, in addition, six or eight species of *Lycopus*, or water horehound, are rather abundant.

HORGEN, hör'gen. A town in Switzerland, on Lake Zurich, 10 miles southeast of Zurich (Map Switzerland, C 1). Surrounded by vineyards and fruit orchards, it is a thriving industrial centre, with manufactures of cotton and silk goods and chemicals. Pop, 1900, 6914, 1910, 8006.

HORICON. The Indian name of Lake George, N. Y.

HORITES. An ancient people who dwelt in and around Mount Seir before the Edomites came there (Deut. 11, 22, 23). Biblical tradition preserves a recollection that the Horites formed a group of seven tribes (Gen. xxxvi. 20-30). They are said to have been smitten by Chedorlaomer and the kings of the East when they attacked Sodom in the days of Abraham (Gen. xiv. 6). They seem to have been absorbed by the Edomites, among whom several Horite clans continued to exist. The name is probably identical with the *Haru* of the Egyptian inscriptions. If so, it appears that the Horites also occupied territory in the West Jordan country, as the name seems to apply to the whole of southern Syria. Folk etymology explained it as "cave dwellers"; but this is doubtful, as is also the attempted identification with the *Harri* or Aryans, found among the Mitannians. Consult Ed Meyer, *Die Israeliten und ihre Nachbarstämme* (Halle, 1906), and Bohl, *Kanaanäer und Hebräer* (Leipzig, 1911). See EDOM.

HORIZON (Lat. *horizon*, from Gk. ὁρίζω, pres. p. of ὁρίζω, *horizein*, to bound, from ὅρος, *horos*, boundary). 1. In popular language, the

circular line formed by the apparent meeting of earth and sky. Astronomers call this the *sensible horizon*, distinguishing it from the *rational horizon*, i.e., the circle formed by a plane passing through the centre of the earth, perpendicular to the plumb line, and produced to meet the heavens. 2. A term in geology, referring to a bed or beds which are characterized by some special forms of fossils found in them.

HORLA, ôr'la', LE. A story dealing with madness, by Guy de Maupassant (1887), who himself became insane in 1892.

HORMAYR, hör'mir, JOSEPH. BARON (1782-1848). An Austrian historian, born at Innsbruck. He studied law at the University of Innsbruck and afterward entered the Ministry of Foreign Affairs at Vienna. In collaboration with Archduke John he published a number of pamphlets against Napoleon, and in 1809, as intendant in the army commanded by John, he incited the popular uprisings in the Tirol, Vorarlberg, and Salzburg. After the truce of Znaim he returned to Vienna and devoted himself to historical work until his unauthorized attempt to stir up another revolt among the Tyrolese led to his being arrested at Metternich's command. On his release the Emperor made him court historiographer, but his imprisonment had so embittered him against Metternich that in 1828 he accepted the position of Councillor in the Bavarian Ministry of Foreign Affairs. Four years afterward he was sent to Hanover to represent the Bavarian government and in 1837 was transferred to Bremen. In 1846 he was given charge of the government archives at Munich. His intimate connection with public men and events during one of the most interesting periods of European history gives a peculiar value to his writings, many of which deal with subjects of which he had a first-hand knowledge. His publications include *Allgemeine Geschichte der neuesten Zeit, vom Tode Friedrichs des Grossen bis zum zweiten Pariser Frieden* (1817-19, 2d ed., 1831), the much criticized but highly entertaining *Lebensbilder aus dem Befreiungskriege* (1841-44), and *Das Land Tirol und der Tirolerkrieg von 1809* (1845).

HORMIZD, hör'mist, or **ORMAZD**. The name of several kings of Persia. See SASSANIDÆ.

HOR'MOGO'NIA (Neo-Lat. nom. pl., from Gk. ὁρμος, *hormos*, chain + γόνιμος, *gonimos*, productive, from γόνος, *gonos*, seed). A term applied to the fragments into which the filamentous colonies of certain blue-green algae separate, each of which produces a new colony. See CYNOPHYCEÆ.

HORMONES, hör'mönz (Gk. ὁρμάω, *hormaō*, I excite). A name applied by Sterling and Baylies to certain secretions which are supposed to act as "chemical messengers" between glands having an internal secretion (e.g., the pituitary body, thyroid gland, and suprarenal capsules) and to harmonize their activities. Schafer holds that the term should be restricted to those principles which promote glandular activity, applying the term "chalone" (from Gk. χαλᾶω, *chalaō*, I relax) to the principles which check activity. Consult Biedl, *Internal Secretory Organs* (New York, 1913).

HOR'MOS (Gk. ὁρμος, *hormos*, chain). A Greek dance in honor of Diana and supposed to have been instituted by Lyeurgus. The dancers, both men and women, were entirely nude and wound through the public streets, a young couple leading. The rhythmic steps were now towards

the east and now towards the west, and the dance is therefore believed by some to have had astronomical significance. The figures were chaste and beautiful, and the nudity of the women was defended by Plutarch, who said he wished to have them become the equals of men in all respects and "learn to despise the opinion of the vulgar." The name was also applied to an ancient Scottish dance.

HORMUZ See ORMUZ

HORN (AS *Icel*, OHG *horn*, Ger *Horn*, Goth *hairn*, Runic *horna*, horn, connected with Ir, Welsh *corn*, Galatian *ἀρνον*, *harnon*, Lat. *cornu*, horn, and ultimately with Gk *κέρας*, *keiras*, Skt *śṛṅga*, horn, as well as with Lat *ceruus*, AS *heorot*, Eng *hait*) (1) A modification of the cuticle observable in man and most other vertebrated animals, and (2) a special adaptation of this substance to form appendages of the head in certain mammals. The word has many other applications, more or less remote from this, in zoology as elsewhere. Thus, the chitinous material of the harder parts of insects is frequently termed horn, whereas the tortoise shell, which is truly of this nature, is rarely so designated. The projections from the prothorax of stag and other beetles, the feelers or ovipositors of other insects, the eye stalks of snails, frontal feathers (plumicorns) of owls, the projecting front teeth of the narwhal, etc., are frequently called horns, though all are different in both substance and function from the true horns to which this article is restricted.

Nature and Service of Horn Horn is the connective tissue of the epidermis hardened and thickened and in some cases mixed with or composed of agglutinated hairs. Its purpose is to form a resisting or protective surface or a tough tool or weapon. The whole, or principal part, of the epidermis may become of this nature, as is the case in the hide of armadillos and the scaly anteaters, ancient and modern, in serpents and lizards (whose scales are horny), and in the turtles which supply tortoise shell (qv). In the higher ranks it constitutes the whalebone developed from the palate of the baleen-bearing whales, becomes the protective sheath of the mandibles forming the serviceable beaks of birds and turtles, and, by more or less completely insheathing and extending the outermost bone of each digit, forms nails, claws, and hoofs (see NAIL), strengthening and arming the fingers and toes of such reptiles as have feet, of all birds, and of all the mammals except whales. Horn enters also into spurs on the legs and other parts of certain animals, forms one or more shields or weapons, or both, on the head; and callosities elsewhere, such as on the heel of man (and the corns on his toes), the knees of camels, etc., as use and habit call for a hardening of the cuticle to resist wear and relieve pressure. Further particulars as to these structures will be found in the articles BIRD, *The Beak*, CORN, INTEGUMENT, NAIL (nails, claws, hoofs, spurs, etc.), SKELETON, SNAKE (scales, rattle, etc.), TORTOISE SHELL, TURTLE, and under HORNS. The chemical composition of the various horny tissues is exhibited in the table accompanying this article.

These tissues differ slightly in the quantity of inorganic matter which they contain, but the difference does not vary much beyond 1 per cent. Hair yields from 0.54 to 1.85 per cent of ash, containing, among other ingredients, peroxide of iron and a little silica. In feathers the quan-

tity of silica is very considerable, and it is doubtless to this constituent that the shaft in a great measure owes its strength and hardness.

Horny Tissue appears as a variety of tumor upon different regions of the human skin, but especially upon the face and occasionally in dermoid cysts. These manifestations are considered as warts, of which the epidermal cells are intimately united in the same manner as in the nails, and they are classed with warts, corns, and some naevi, under the term "corneous papillomata." The tendency to horny excrescences on the skin is rare and belongs to advanced age. There is a disease of the skin called hystriicismus, which is a peculiar variety of papillary hypertrophy, with hornifying of the epidermis of such a nature that it resembles short porcupine quills. Horny excrescences occasionally break and fall off spontaneously, but they grow again if not cured radically by the excision of the portion of skin upon which they are located.

Economic Uses of Horn The horns of animals enter largely into the manufacture of many useful and ornamental articles and are employed for useful and ornamental purposes. The principal horns employed are those of the ox, sheep, and goat. These are quite different in structure from the antlers of various deer, which are really bone and resemble ivory in structure. More like true horns are hoofs, claws, nails, and quills. Horns have but 2 or 3 per cent of earthy matter, while bones have over 50 per cent. Horn can be softened and split into thin layers or laminae or pressed into molds. As it recovers its peculiar character of flexibility, toughness, and transparency when cold, it is particularly adapted for a great variety of purposes. It can also be dyed various colors. A solution of gold in aqua regia dyes it red, a solution of nitrate of silver in nitric acid, black, a paste of red lead, made with a solution of potash, colors it brown, so that with a proper arrangement and application of these materials, the most admirable imitations of the much more costly tortoise shell can be produced, which, indeed, it resembles in structure. The more common vegetable dyestuffs, as logwood, brazilwood, barwood, saffron, indigo, etc., will also color horn, but neither so permanently nor so brightly as the metallic materials.

By long-continued soaking, the horns of all the animals above mentioned can be softened, and those of the sheep and goat can easily be split into several layers after they have been soaked and boiled. These layers can not only be flattened out by putting them between smooth iron plates heated and placed in a press, but can be welded together firmly by pressing their edges together between polished copper plates and then plunging them for some time into boiling water and then into cold water. This property enables the horn worker to use up the smallest cuttings with profit. Another valuable property of horn is that when heated it can be pressed into a die and not only takes a beautiful sharp impression, but if left in the die until cold it retains it. In this way it is employed in making handles for umbrellas, knives, forks, and a variety of other articles. Combs are made out of the flattened sheets, and beautiful carvings were made out of the solid parts of buffalo horns. Ox horns, too, are sometimes of fine quality and color and are fashioned into drinking cups and other articles, often highly orna-

mental Before the horn is softened for manufacture the solid tip is usually sawed off, to be treated separately This is usually sawed into blanks to be used for buttons and other purposes These blanks are heated, pared, heated

Stanislaus Leszczynski, his successor, he remained as Ambassador In 1705 he was made counselor to the King In 1710 he became Prime Minister and favored the calling of the estates. After the death of Charles XII he per-

CONSTITUENTS	Hair	Horse's hoof	Cow's horn	Nails	Epidermis	Whale-bone	Tortoise shell
Carbon	50 65	51 41	51 03	51 09	50 28	51 86	54 89
Hydrogen	6 36	6 96	6 30	6 32	6 76	6 87	6 56
Nitrogen	17 14	17 46	16 24	16 90	17 21	15 70	16 77
Oxygen	20 85	19 94	22 51	22 39	25 01	21 97	19 56
Sulphur	5 00	4 23	3 42	2 80	74	3 60	2 22

again in water, and pressed between dies, after which they are buffed and polished

HORN A musical instrument, belonging to the family of brass wind instruments and distinguished by a cupped mouthpiece, a flaring bell, and a narrow, conical tube which is between 9 and 18 feet long and is twisted back on itself The natural or French horn (qv), although having an exceedingly tender, sonorous tone, was a very imperfect instrument and is now entirely superseded by the valve horns The horn is built in almost any key, there are horns in A, B \flat , C, D, E \flat , E, F, G Its range is from C to c² As the horns (except the one in C) are transposing instruments, lower tones than C can be obtained by using different horns For instance, on the low B \flat horn the note C sounds B \flat , on the E \flat horn E \flat , etc The music for horns is always written in the G clef, except the very low tones Strange to say, the tones written in the bass clef are always written an octave lower than the actual sound In the smallest orchestra there are always two horns The ordinary symphony orchestra has four, and Wagner employs as many as eight When four horns are used, the first and third are written on the same staff in the score, and the second and fourth together on another staff What kind of horns are employed depends upon the tonality of the composition and also to some extent upon the modulation within the tonality Thus, a composer writing in C major might employ two horns in C and two in F or two in C and two in G Some modern masters use the F horns for all keys A peculiarity in writing music for horns is that no key signatures are used All music is written in C, and every chromatic alteration is specially marked Muted tones can also be produced upon the valve horns They have a peculiarly ominous sound and are sometimes employed in dramatic works to express situations of fear, horror, mystery, etc In view of the expressiveness of the instrument and the beautiful and varied effects obtainable it is somewhat surprising that composers have practically neglected it as a solo instrument Schumann wrote a quadruple concerto for four horns with orchestra, op 86, and R Strauss a horn concerto, op 11 Beethoven and Brahms employed it with splendid effect in their chamber music Consult V Mahillon, *Le cor* (Brussels, 1907), and J Blakley, *The French Horn* (London, 1909)

HORN, hörn, ARVID BERNHARD, COUNT (1864-1742) A Swedish statesman, born at Vuorentaka, Finland. After seeing service on the Continent for several years, he joined the Swedish army and was rapidly promoted to be general of brigade (1700). He assisted in the deposition of King Augustus of Poland (1704), and under

sued the latter's sister, Ulrica Elnore, to submit to an election before she could ascend the throne and later imposed on her the constitution of 1719 The years when he was marshal of the Kingdom were spoken of afterward as the "time of Arvid Horn," so successful had the country been under his leadership He retired from active life in 1738 Consult Svedelius, *Arvid Bernard Horn* (Stockholm, 1879)

HORN, CAPE See CAPE HORN

HORN, GUSTAF, COUNT (1592-1657) A Swedish general, born at Orbyhus He studied at the universities of Rostock, Jena, and Tübingen, entered the army in 1612, and served in the Russo-Swedish War (1612-14) In 1630 he commanded half the army of Gustavus Adolphus in the advance of that monarch upon Frankfurt-on-the-Oder He directed the Swedish left in the battle of Breitenfeld, in 1631, and participated in the defeat of Tilly's army on the Lech In 1634 he was completely defeated, together with his ally, Bernhard of Weimar, at Nördlingen and made a prisoner by the Imperialists He was not released until 1642 He later distinguished himself in the war against Denmark Consult *Seine Briefe*, edited by Sondén (Stockholm, 1897).

HORN, PAUL (1863-1908) A German specialist in modern Persian philology, born at Halle His education was at the university in that city, where he devoted himself chiefly to Oriental and linguistic studies and received the degree of Ph D in 1885 In 1889 he became privatdocent and in 1900 professor at the University of Strassburg He wrote *Die Nominalflexion im Avesta und den altpersischen Keilinschriften* (1885); *Sassanidische Siegelsteine* (1891); *Die Denkwürdigkeiten Schah Tahmāsp's* (1891); *Grundriss der neupersischen Etymologie* (1893); *Neupersische Schriftsprache* (1898); *Die deutsche Soldatensprache* (1899); *Geschichte Irans in islamitischer Zeit* (1900); *Geschichte der persischen Literatur* (1901); *Geschichte der türkischen Moderne* (1902); *Die persischen Gedichte des türkischen Sultans Selim* (1904); "Die türkische Literatur," in *Die Orientalische Literaturen* (1906).

HORN, HOORNE, HOORN, or HORNES, or, PHILIP DE MONTMORENCY-NEVELE, COUNT OF (c 1518-68) A Flemish statesman and soldier born at Nevele Trained to arms under Charles V, he distinguished himself in the war against the Schmalkaldic League and later accompanied Philip II on his travels in Germany, Italy, Spain, and England At the battle of Saint-Quentin (1557) Horn did brilliant service as commander of the artillery Later he accompanied Philip to Spain, but in 1561 returned to Brussels, as Councilor of State In this capacity he sided with Egmont and the Prince of Orange

in opposition to Cardinal Granvella and the Spanish party. He urged on Margaret of Parma to a policy of concession, and, having been sent to Tournay to reestablish order there, he showed a spirit of toleration which won for him the regard of the patriotic party, but increased the animosity of the Ultramontanes. The failure of Egmont (qv) and Horn to throw in their lot with the Spanish party was, however, fatal. When the Duke of Alva arrived, the two noblemen were treacherously seized and, after an illegal trial before the Council of Blood, were executed in the great square of Brussels, June 5, 1568. Besides the contemporary chronicles, consult Juste, *Le comte d'Egmont et le comte de Hornes* (Brussels, 1863), the popular account by Schiller, "The Trial and Execution of Counts Egmont and Horn," in his *Works*, vol. iv (Philadelphia, 1883), *Cambridge Modern History*, vol. iii (New York, 1905), also the histories by Motley and others, cited under NETHERLANDS.

HORN, VAN DE, or VAN (1635-83). A Dutch buccaneer. After studying seamanship on board of merchant vessels at the age of 24 he bought one of his own and set up as a pirate. Next he became a sailor of fortune, serving whichever European power would pay him most highly, and it was chiefly France that engaged him to wage war upon Spanish ships by fair means or foul, generally the latter. He was with De Graff in the despoiling of Vera Cruz (1683), but fought a duel with him over the division of plunder and died from the results of the wound that he received.

HORN'ADAY, WILLIAM TEMPLE (1854-). An American zoologist, born at Plainfield, Ind., and educated at the Iowa State Agricultural College and in Europe. In 1875-79 he was collecting naturalist for Waid's Natural Science Establishment, Rochester, N. Y., and he served as chief taxidermist of the United States National Museum in 1882-90 and as superintendent of the National Zoological Park in 1889-90. After some years in the real-estate business at Buffalo, N. Y., he was appointed director of the New York Zoological Park in 1896. He became president of the Wild Life Protective Association and was president of the American Bison Society in 1907-10, through his efforts, especially in the direction of legislation, much was done to protect wild birds, game, seals, bison, and wild life in general. Besides numerous magazine articles, he is author of *Two Years in the Jungle* (1885, 7th ed., 1901), *Free Run on the Congo* (1887), *The Extirpation of the American Bison* (1887), *Taxidermy and Zoological Collecting* (1891), *The Man who Became a Savage* (1896), *Guide to the New York Zoological Park* (1899), *The American Natural History* (1904, rev. ed., 4 vols., 1914), *Camp-Fires in the Canadian Rockies* (1906), *Camp-Fires on Desert and Lava* (1908), *Our Vanishing Wild Life* (1913), *Wild Life Conservation in Theory and Practice* (1914).

HORN'NAU, BARON VON. See GERBERT, MARTIN.

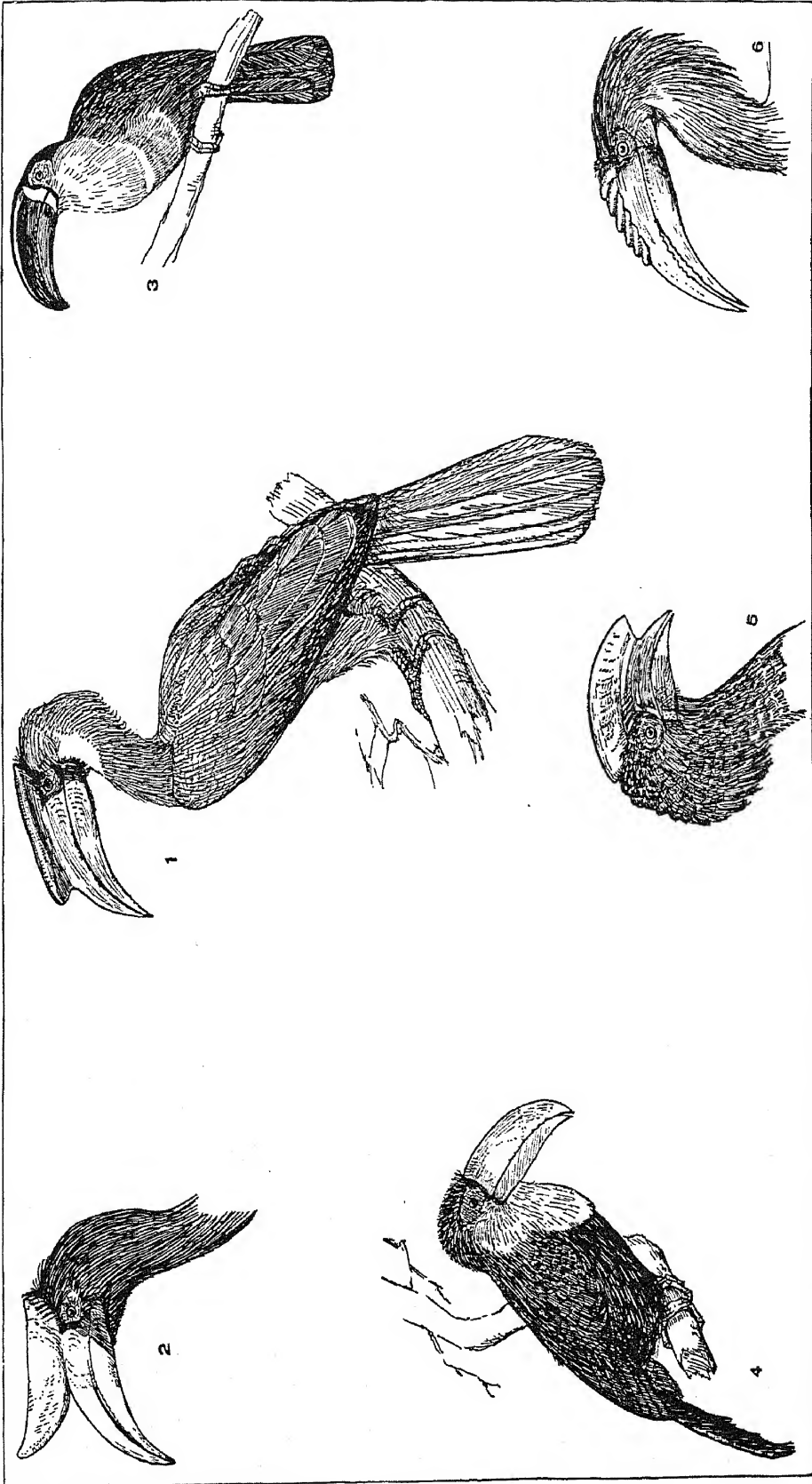
HORN'BEAM' (*horn* + *beam*, AS *beam*, OEG *boum*, Ger *Baum*, tree, connected ultimately with Gk. *phyein*, to grow, Skt *bhū*, to become), *Carpinus*. A genus of the family Betulaceae, which consists of trees with compact, tough, hard wood, almost smooth whitish-gray bark, deciduous leaves, and monocious flowers. The common hornbeam, or white beech,

of Europe (*Carpinus betulus*), very frequent in moderately moist shady woods of many parts of Europe, is a beautiful tree which attains a height of 60 to 100 feet. It has ovate, acuminate, almost triply serrate leaves, and the small nutlike fruit is subtended by large deeply three-partite bracts. The wood, which is much used by carpenters and wheelwrights, is white, very hard, uncommonly strong and tough, and therefore suitable for bearing heavy strains. It takes a very fine polish and, when well stained, might readily be mistaken for ebony. In the earth, or where exposed to the changes of the weather, it is not very durable. It burns readily and is one of the best kinds of firewood, it affords an excellent charcoal, and the ashes yield much potash. The young stems, by reason of the dense growth of their twigs, are very suitable for forming live fences and bowers, and as it bears clipping well, the hornbeam was often employed to form live walls, formerly fashionable. The genus is represented in North America by *Carpinus caroliniana*, a small tree 25 to 40 feet high, which occurs from Quebec to Florida and west to Minnesota and Texas. Its wood is very hard, dense, and heavy, and is one of the toughest woods of the Northern States. It is known as hornbeam, blue beech, water beech, and ironwood. The hop hornbeam (*Ostrya virginiana*) is of much the same habit, range, and properties. It is of slow growth and is seldom planted, although a very ornamental tree. This tree is also known as ironwood and leverwood.

HORN'BILL'. The name of an African and East Indian family of large birds, forming the family Bucerotidae and remarkable for the enormous size of the bill and for a large bony protuberance (epithema, or casque) with which it is usually surmounted. The bill is curved, broad at the base, compressed towards the tip, the bony protuberance on the upper mandible assuming different forms in different species. Two subfamilies are sometimes recognized—the Bucerotinae and the Bucerotinae. The former are African, have the casque hollow, and are of terrestrial habits. They are described under GROUND HORNBILL. The latter contain the "true" or typical hornbills, of which there are many genera and species scattered over north-western Africa, India, and the Oriental region. All are rather large birds, the biggest 5 feet in length from the tip of the beak to the end of the tail, have long full tails and strong feet, fitted for arboreal habits. Their colors are mainly black and white, the great bills are yellow, often strongly marked with red and black. They are omnivorous and in captivity show an ostrich-like voracity, swallowing anything offered, bones and all. The food is always caught in the tip of the bill, then tossed into the air and recaptured. In nature they feed largely upon flowers and fruit, cut from their fastenings by the saw-edged beak. Their flight is slow and heavy, but it may be long sustained. The bird is very noisy, the sound of the wings of a large hornbill being audible for a mile, and when two or three are flying together the noise is said to resemble that made by a steam engine.

Breeding Habits. Some, if not all, of the species have the remarkable habit of imprisoning the female during incubation. This is done by stopping up the entrance to the nest, which is in a hollow tree, with mud or excrement. There seems to be some doubt whether it is done

HORNBILLS AND TOUCANS



1. FLAT-CASQUED HORNBILL (*Hydrocorax planicornis*); male.
2. RHINOCEROS HORNBILL (*Buceros rhinoceros*).
3. ARIEL TOUCAN (*Ramphastos ariel*).
4. MEXICAN TOUCAN (*Ramphastos carlinatus*).
5. CRESTED TRUMPETER HORNBILL (*Bycanistes cristatus*).
6. PAPUAN WREATHED HORNBILL (*Phylidoceros plicatus*); male.

from the outside by the male, using mud, or from the inside by the female, using her own excrement. Perhaps the method differs in different species. In any case a small opening is left through which the female can extend her bill and secure the food which the male brings. Such nests are an excellent protection against enemies and are said to be used repeatedly. The young are born naked.

This remarkable method of nidification is connected with a strange feature of bird economy first noticed and studied by Bartlett, who shows (*Proceedings Zoological Society of London*, 1869) that hornbills at intervals cast the epithelial layer of their gizzards—a layer formed by the secretions of certain glands. This is ejected entire in the form of a bag, the mouth of which is closely folded, and which is filled with the fruit the bird has been eating. Whether these castings form a nutritious and partly digested supply of food for the sitting female is not known. Consult Newton, *Dictionary of Birds*, London, 1896.

Species. The bird ordinarily presented as the hornbill, *Buceros rhinoceros*, from the East Indies, is shown on the accompanying plate. It was known and quaintly described, from preserved heads alone, by Pliny and the naturalists of the Middle Ages. A closely allied species (*Buceros sylvesteris*) is a native of Java. Another style of casque, the flat table, is shown in Fig 1 of the plate (*Hydrocorax planicornis*, of the Philippines), which illustrates almost equally well the "homurai" of India (*Dichoceros bicornis*), whose plate casque is bent into a trough and terminates in two horns in front. This familiar species is found eastward to Sumatra, where also, among other kinds, lives that solid-casqued one (*Rhinoplax vigil*) out of whose 'helmet' ivory-like ornaments are carved. This seems to be a remarkable species in several ways. Another curious form of beak is that of the Papuan *Rhytidoceros plicatus*, in which the top of the bill has numerous curving transverse folds. Prominent among African genera are the trumpeter hornbills, one species of which is the "crested" (*Bycanistes cristatus*). Here the beak is comparatively short. In some genera the bill approaches the shape of a toucan's and has little or no casque. Consult history of the family, with colored plates, by D. G. Elliot, entitled *Monograph of the Bucconidae* (London, 1882). An excellent popular account is given in the *Royal Natural History* (ib., 1895) and in Knowlton, *Birds of the World* (New York, 1909). See Plate of HORN BILLS AND TOUCANS.

HORNBILL CUCKOO. A channelbill (q v).

HORN'BLEND'E' (horn + blende, Ger. *Blende*, from *blenden*, to blind). A greenish-black or black variety of amphibole that crystallizes in the monoclinic system and is a ferrous magnesium-calcium-aluminum silicate. It is found both in crystals and granular masses. Hornblende is a common constituent of various igneous rocks, such as granite, syenite, diorite, and those of more basic composition. Hornblende schist and hornblende slate are varieties of rocks that contain hornblende with more or less feldspar, quartz, or mica. The black crystallized varieties of hornblende are sometimes called *schorl* and may be cut into ornaments. The term "hornblende" was formerly used to designate the entire group of the amphiboles, and the term is still used by petrographers in a

somewhat broad sense to include a great number of the rock-forming amphiboles.

HORN'BLENDITE. An igneous rock of granitic texture very largely composed of hornblende. Hornblende occurs in the so-called Cortland series of eruptives in the Highlands of the Hudson River, near Peekskill, N. Y.

HORN'BLOW, ARTHUR (1865–) An American playwright, born in Manchester, England. Educated in England and in France, in 1889 he came to the United States, where he was connected with various newspapers until 1900. He then became editor of the *Theatre Magazine*. He translated certain writings of Marcel Prevost and of Gabriele d'Annunzio, novelized several of Charles Klein's plays, including *The Lion and the Mouse* (1906), *The Third Degree* (1909), *John Marsh's Millions* (1910), *The Gamblers* (1911), *The Money-Makers* (1914); collaborated on various plays, and is sole author of *The End of the Game* (1907), *The Profligate* (1908), *By Right of Conquest* (1909), *The Mask* (1913), *The Price* (1914).

HORN'BLOW'ER, or HORNWORM. A local name in the southern United States for the tobacco worm (*Phlegethontius carolina*). See TOBACCO WORM.

HORN'BOOK'. The primer for learning the elements of reading, used in England before the days of printing, and common down to the time of George II. It consisted of a single leaf, containing on one side the alphabet large and small, in black letter or in Roman, often followed by a number of monosyllables. Then came a form of exorcism and the Lord's Prayer and the Roman numerals. The leaf was usually set in a frame of wood, with a slice of transparent horn in front, hence the name. There was a handle usually with a hole for a string, whereby the apparatus was slung to the girdle of the scholar. Sometimes the leaf was simply pasted against a slice of horn. At first the leaf was of vellum, with the characters in writing, later, of paper and printed. The hornbook was prefaced and ornamented with figures of the cross and hence came to be often called *christ-cross-row*, or *crisscross-row*. Common as hornbooks at one time were, copies of them are now exceedingly rare. Consult G. W. Tuer, *History of the Hornbook*, with illustrations and facsimiles (London, 1897).

HORN'BOSTEL, HENRY (1867–) An American architect. Born in Brooklyn, N. Y., he graduated from the School of Architecture of Columbia University in 1891 and studied four years at the Ecole des Beaux-Arts, Paris. As a member of the architectural firm of Palmer and Hornbostel, he was collaborative architect notably of the Manhattan and Queensborough bridges in New York City, of the Carnegie Technical Schools, of the University of Pittsburgh, and the Memorial Building at Pittsburgh, Pa., and of the State Education Building at Albany, N. Y. He served as an assistant in architecture (1897–1900) and as lecturer (1900–03) at Columbia, and later he became professor of architecture in the Carnegie Technical Schools.

HORN'BY, SIR GEOFFREY THOMAS PHIPPS (1825–95). An English admiral, son of Admiral Sir Phipps Hornby (1785–1867), born at Winwick, Lancashire. He entered the navy when he was 12, was present at the bombardment of Acre, served in 1844–46 under Wyvil, who was at that time engaged on the east coast of Africa in suppressing the slave trade, and

was flag lieutenant to his father in the Pacific from 1846 to 1850. He was promoted to the rank of captain in 1852. Six years later he was appointed to the *Tribune*, then at Hong-kong, but immediately afterward was ordered to Vancouver Island, where the right to the island of San Juan was in dispute between Great Britain and the United States. Subsequently he saw almost continuous service in European waters. He was promoted to flag rank in 1869, became vice admiral and Lord of the Admiralty in 1875, and two years later was put in command of operations in the Mediterranean. In February, 1878, he "proceeded to Constantinople," in spite of the protests of the Turkish government, and prepared to meet any attack on the city by Russia. He was made an admiral (1879), president of the Royal Naval College (1881-82), and admiral of the fleet (1888). Consult the life by his daughter, Mrs Edgerton (London, 1896).

HORNBY, JAMES JOHN (1826-1909) An English educator, born at Winwick. He was educated at Eton and at Balliol College, Oxford, after his graduation being elected fellow of Brasenose. From 1853 to 1864 he served as principal of Bishop Cosin's Hall at the University of Durham. He then returned to Oxford for a short time as classical lecturer, in 1867 became second master of Winchester School, from 1868 to 1884 was head master of Eton, and thereafter until his death was provost.

HORNE, C SILVESTER (1865-1914) An English Congregational clergyman, born at Cuckfield, Sussex. He was educated at Glasgow University and studied theology at Mansfield College, Oxford. In 1889-1903 he was minister of Kensington Chapel and then of Whitefield's Church, Tottenham Court Road, until January, 1914, when his health began to fail. In the spring of 1914 he delivered the Lyman Beecher lectures on preaching (*The Romance of Preaching*) at Yale University, and he died near Toronto. In 1910-11 he had been chairman of the Congregational Union, and from 1910 on he was a member of the House of Commons (the only member who was a clergyman with a charge) from Ipswich, being an "unpenitent Radical," a supporter of woman suffrage, and a home-ruler. He wrote on the history of the Free churches and of the London Missionary Society, and in 1914 published *Pulpit, Platform, and Parliament* and *The Romance of Preaching*.

HORNE, GEORGE (1730-92) An English bishop, born at Otham. He was educated at Oxford and spent the greater part of his life there, being elected president of Magdalen College in 1768 and in 1776 vice chancellor of the university. He was made dean of Canterbury in 1781 and in 1790 Bishop of Norwich. From 1771 to 1781 he was chaplain in ordinary to the King. His only important work, *A Commentary on the Psalms* (1771), exhibits a deep acquaintance with Hebrew and biblical lore and is marked by a spirit of earnest piety. He wrote many pamphlets against such antagonists as Sir Isaac Newton, Hume, Adam Smith, and David Law, all of whom he ludicrously underrated. He adopted the views of John Hutchinson (qv) and wrote in his defense.

HORNE, RICHARD HENRY, or HENGIST (1803-84). An English author. He was born in London, received a military education, and served as a midshipman in the Mexican navy during the war of that country with Spain. After a

few years spent in adventurous wanderings he returned to England and from 1828 devoted himself to literature. In 1837 he published two tragedies, *Cosmo de Medici* and *The Death of Marlowe*, in 1843, *Onion*. An *Epic Poem*. During the period 1839-46 he carried on a correspondence with Elizabeth Barrett (afterward Mrs Browning), and her letters to him were afterward published in two volumes in 1877. With her he collaborated in the *New Spirit of the Age* (1844). A report prepared by him on the employment of children in mines and factories inspired Mrs Browning's *City of the Children*. Going to Australia in 1852, he served as a gold-fields commissioner and a magistrate and published *Australian Facts and Figures* (1859). Returning in 1869, he wrote thereafter a number of books, few of which were of any special note.

HORNE, THOMAS HARTWELL (1780-1862) An English Bible scholar. He was born in London, Oct 20, 1780, was educated at Christ's Hospital, and became clerk to a barrister. His leisure hours were devoted to study and to miscellaneous literary labors. In 1818 he published his *Introduction to the Critical Study and Knowledge of the Holy Scriptures* (12th ed, 1869), a work which procured for him admission into orders without the usual preliminaries. This book was long a standard work, but is now antiquated. In it he presented the results of 17 years of hard work. In 1824 he became senior assistant librarian in the department of printed books in the British Museum. In 1831 he became a prebendary of St Paul's Cathedral, in 1833 rector of the united parishes of St Edward the King and Martyr and St Nicolas Acons, London. He resigned his assistant librarianship in 1860. He died in London, Jan 27, 1862. Consult his life by his daughter, Mrs S A. Cheyne (London, 1862).

HORNED DACE A fish. See DACE.

HORNED FROG. One of the large toadlike South American frogs of the genus *Ceratophrys*, especially *Ceratophrys cornuta*, which has horn-like protuberances on the head. It is one of the most beautiful frogs known. The ground colors are black, brown, and green, with an orange stripe over the head and back, and these colors are irregularly and most pleasingly arranged and blended. Various other gaudy and interesting species are known in the American tropics. See Colored Plate of FROGS AND TOADS, under TOAD.

HORNED GREBE. See GREBE.

HORNED HOG. See BABIRUSSA.

HORNED LARK. See SHORE LARK.

HORNED OWL. Any owl with plumeorns, i e, tufts of upright feathers on the top of the head which simulate horns. The eagle owls (qv) are thus distinguished, and then American representative is commonly called the great horned owl. Other horned species are mentioned and illustrated under OWL. See Plate of OWLS, REPRESENTATIVE.

HORNED PHEASANT. A sportsman's name in India for the tragopans (qv), especially the black-headed species (*Tragopan satyra*), common in the eastern Himalayas. The name is given because of the presence of two fleshy horns on the head which become very conspicuous at the breeding season.

HORNED POUT. See BULLHEAD, CATFISH.

HORNED RATTLESNAKE, or SIDEWINDER. See RATTLESNAKE.

HORNED SCREAMER. A bird See SCREAMER

HORNED TOAD, or HORNED LIZARD The common name of several short-legged, depressed, toadlike horny lizards, all of which occur in North America. According to Cope and others, there are two genera, *Phrynosoma* and *Anotia*, containing about 20 species, 10 of which occur in the United States. *Anotia* differs from *Phrynosoma* only in the fact that the tympanic drum is concealed by a scaly integument. Horned toads range from British America into Mexico. They feed mainly on insects, which they capture with a rapid thrusting out of their mucilaginous tongues. They are sluggish, harmless lizards, with little power of self-defense save their pointed scales, which, when bristled up, are a disagreeable mouthful for snakes, their most formidable foes. They will, however, fight and even kill a snake small enough to be an even match.

Horned toads at rare intervals exhibit a most interesting habit of self-defense, the ejection of jets of blood from the corner of the eye. Ditmars gives some details of such an occurrence which took place when a specimen from Mexico was being measured. This handling seemed greatly to excite the creature which 'finally threw the head slightly upward, the neck became rigid, the eyes bulged from the sockets, when there was a distinct sound like that produced if one presses the tongue against the roof of the mouth and forces a small quantity of air forward. This rasping sound, consuming but the fraction of a second, was accompanied by a jet of blood at great pressure. It hit the wall, 4 feet away, at the same level as that of the reptile. The duration of the flow of blood appeared to be about one and a half seconds, and towards its termination the force gradually diminished, as noted by a course of drops down the wall and along the floor to a position almost under the spot where the reptile had been held. The stream of blood seemed to be as fine as a horsehair and to issue from the eyelid, which was momentarily much swollen. For some time after the performance the eyes were tightly closed, and nothing could induce the lizard to open them. Within two minutes after it was placed on the ground the protruding aspect of the eyeballs and the swelling of the eyelids had disappeared. Most surprising was the amount of blood expended. The wall and floor showed a course of thickly sprinkled spots about one-eighth of an inch in diameter. There were 103 of these spots."

The majority of the species are desert inhabitants and escape pursuit by hiding beneath the prickly agaves, yucas, and cacti of the plains. Other species live in cedar and pine belts. Both those forms that live on the bare stones or sand of the plains and those that occur in the pine belt are remarkably well protected by resemblance to their background. The young, a dozen or more at a time, are born from eggs, which are laid by the mother only an hour or so before they are ready to hatch. When the little ones emerge, they are able to begin at once to catch and eat minute insects. Both young and old make interesting pets, largely because of their amusing irascibility, and can be taught to take flies from the hand and do other simple things. Consult Bryant, "The Horned Lizards of California," in *University of California Publications*, ix (Berkeley, 1911).

See LIZARD, and Plate of IGUANA AND OTHER AMERICAN LIZARDS.

HORNED VIPER. See VIPER

HORNEL, hōr'nēl, EDWARD ATKINSON (1864-) A Scottish painter of landscapes, flowers, and foliage, with children. He was born in Australia, of Scottish parents, and he was brought up and lived practically all his life in Scotland, at Kirkcudbright. He studied for three years in the art school at Edinburgh, and for two years at Antwerp under Professor Verlat. Returning from Antwerp in 1885, he met George Henry (qv) and associated himself with the Glasgow school. Hornel and Henry collaborated upon "The Druids," a procession of priests bringing in the sacred mistletoe, gorgeous with polychrome and gold. The two worked side by side to achieve decorative splendor of color, Hornel boldly and freely employing texture effects produced by loading and scraping, roughening, smoothing and staining. In 1893-94 the two artists spent a year and a half in Japan, where Hornel learned much about decorative design and spacing. Towards the close of the nineties his colors, while preserving their glow and richness, became more refined and more atmospheric, and his drawing more naturalistic combining sensuous appeal with emotional and poetic significance. In 1901 he declined election to the Royal Scottish Academy. There are examples of his work in the museums of Buffalo, N. Y., St. Louis, Toronto, Montreal, Glasgow, Edinburgh, Leeds, Manchester, Hull, Bath, and Liverpool.

HORNELL. A city in Steuben Co., N. Y., on the Canisteo River 93 miles southeast of Buffalo, on the Erie, and the Pittsburgh, Shawmut, and Northern railroads (Map New York, C 6). It has a free academy, a public library, hospital, courthouse, sanitarium, and public parks, and manufactures brick, silks, white goods, railway supplies, furniture, beer, electrical machinery, sash, doors, and blinds. The government is administered under a revised charter of 1906, which provides for a mayor in whose power, subject to the consent of the council, rest the appointments to subordinate offices, and a unicameral council. The water works are owned by the city. Settled in 1790, Hornell was part of Canisteo and was called Upper Canisteo until 1820, when it was incorporated as a separate town under the name of Hornellsville, given in honor of Judge George Hornell, who was prominent in the town's early history. Pop., 1910, 13,617, 1914 (U. S. est.), 14,341.

HORNER, FRANCIS (1778-1817) A British statesman and economist, born in Edinburgh. He entered Edinburgh University in 1792, but left (1795) before finishing his course to take up the study of law, and was called to the Scottish bar in 1800. Later, in 1807, after a course at Lincoln's Inn, London, and a telling application to the study of philosophy and economy, he began practice in the western circuit of England. Entering Parliament for Wendover in 1806, he sided with the Whigs, gaining special prominence in the debates on questions of finance and political economy. Horner was much interested in the "bullion" question which arose in 1810 and was chairman of the committee which drew up the first report on the subject. The recommendations embodied therein failed of adoption, but, as a result of his influence, restrictions were placed upon the issue of paper money, thus paving the way for the

success of Peel's Currency Reform Bill in 1841 Horner was one of the three original founders of the *Edinburgh Review*, to which he was a frequent contributor. He died at Pisa, where he had gone to regain health, after a short but brilliant career. Consult Horner, *Memours and Correspondence of Francis Horner* (Boston, 1853).

HORNER, LEONARD (1785-1864) A Scottish geologist and publicist, born in Edinburgh and educated at the university of that city. He joined his father's linen business in 1804 and moved to London, but his chief interest was in science. In 1808 he became a fellow of the Geological Society, of which he was president in 1846 and in 1860, and in 1853 he was elected a fellow of the Royal Society. He returned to Edinburgh in 1817 and there founded the School of Arts in 1821 and helped to organize the Edinburgh Academy. During this period he took a very active part in the educational and political reform movements of Scotland. He was a warden of London University from 1828 to 1831, lived for a time in Bonn, Germany, and from 1833 to 1853 rendered notable service as chief factory inspector. He was author of many papers on geology, education, and the employment of children.

HORNER, RALPH CECIL (1854-) A Canadian religious leader. He was born in the township of Clarendon, Pontiac Co. Quebec, and was educated at the National School of Elocution and Oratory, Philadelphia. Ordained a Methodist minister in 1887, he filled several pastorates, specially emphasizing the evangelistic side of his work during the latter part of his career in the Methodist church. Disapproval of his attitude in this respect led to his suspension in 1895. As a result, he became the founder of a denomination called the Holiness Movement Church, which has duly constituted conferences in Ontario, Manitoba, and Michigan, and supports missionaries in China and Africa. He established also, in 1895, the Holiness Movement College at Ottawa. He published several tracts and religious books.

HORNER, WILLIAM EDMONDS (1793-1853). An American physician, born in Warrenton, Va. He graduated at the University of Pennsylvania in 1814, served as assistant surgeon in the United States Navy during the War of 1812, and from 1831 until his death was professor of anatomy in the University of Pennsylvania. In 1847 he founded St. Joseph's Hospital. In 1824 he announced the discovery of the muscle (tensor tarsi) known as Horner's muscle. He published a number of medical works, including *Pathological Anatomy, Practical Anatomist* (1856), *Special Anatomy and Histology* (8th ed, 1851), *The United States Dissector* (5th ed, 1856); and superintended the preparation of an *Anatomical Atlas* by Henry H. Smith (1844).

HORNER, WILLIAM GEORGE (1786-1837). An English algebraist. He was educated at Kingswood School, near Bristol, and afterward became master there. He also established a school at Bath (1809), where he remained until his death. He had no university training and was not a profound mathematician. He is known solely for his discovery of the ingenious algorithm for approximating the roots of higher numerical equations, which was made known in a paper read before the Royal Society in 1819 and published in the *Philosophical Transactions*. The process is commonly known in

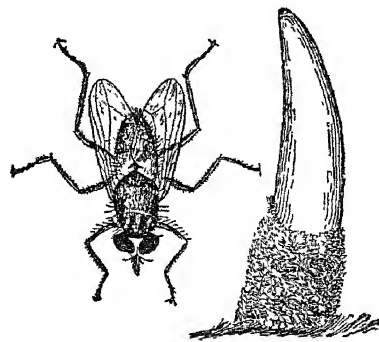
England and America as *Horner's method* and may be found in any higher algebra. Related to it is a process of synthetic division which also bears his name. While this process of approximating the roots of a numerical equation was unknown in Europe at the time of Horner's discovery, it was known to the Chinese algebraists in the thirteenth century. It is given by Ch'in Chiu-shao in 1247 and was used by several later writers in China and Japan.

HORNES, ORN, PHILIP, COUNT OF See HORN.

HORN/NET (AS *hynnet*, *hurnitu*, OHG *hornuz*, *hornaz*, Ger *Horniss*, connected with Lat *crabro*, OChurch Slav *srūsheni*, Lith *szurszone*, hornet, OChurch Slav *srūsha*, Lith *szurszi*, wasp, less plausibly connected with *horn*, either from its antennæ or from its buzzing sound). A name applied to several large stinging insects belonging to the family Vespidae and genus *Vespa*. They differ from *Polistes*, the other common genus of this family, in having larger, thicker bodies and always inclosing their nests with a grayish paper covering. In color they are usually black or dark brown, conspicuously ornamented with white or yellow. The hornet builds its nest, which is in the form of a number of combs placed one above another, in a hole in the ground, or in the open, attached to the branches of a tree, or under the eaves of buildings. Its manner of constructing the nest and caring for the young is the same as that described elsewhere under the title WASP. It is among the most voracious of insects, eagerly laps up all sorts of sweets, and seizes and devours other insects of various kinds. One of the most common species in the United States is *Vespa maculata*, which builds its great nest in the branches of trees. It is very vigilant, and especially irritable when attending to the duties of its nest. The females may often be found hibernating in the autumn and winter in decaying wood.

The European hornet (*Vespa crabro*) has been accidentally introduced into the United States and has established itself in the vicinity of New York City. Its spread has been very slow, and although its original introduction and establishment must have taken place many years ago, it is still apparently restricted to an area of little over 100 miles square. See WASP, and consult the authorities there referred to.

HORNE-TOOKE, JOHN See TOOKE.



HORN FLY.

The adult horn fly, and a cow's horn about the base of which is clustered a swarm of the flies.

HORN FLY A European fly (*Hamatobia serrata*), which was imported into the United

States in 1886 or 1887, multiplied with excessive rapidity, and soon spread over the entire country. It breeds in cow dung and with very great rapidity and prolificacy. It is a biting fly and greatly annoys cattle. The name "horn fly" is derived from a habit which the flies have of clustering in great numbers so as to form black bands around the bases of the horns of cattle. They do not damage the horns, as has been supposed, but simply rest in this location, where they cannot easily be reached by the cow. Consult Osborn, *Insects Affecting Domestic Animals* (Department of Agriculture, Washington, 1896), Lintner, "The Cow-Horn Fly," in *The Country Gentleman* (London, 1897), Parrot, "Horn-Fly Remedy," in the *Kansas Farmer* (Topeka, 1899).

HORNIMAN, hŏr'ni-man, ANNIE ELIZABETH FREDERICKA (1860-) An English dramatic manager. She was born in Forest Hill, Kent, and was privately educated and studied art at the Slade School, London. In 1894 she attempted her first dramatic experiment at the Avenue Theatre. In 1904 she provided the Irish National Theatre Society with a theatre—the Abbey Theatre, Dublin—at her own expense, and subsidized it for a term of years. In 1908 she bought the Gaiety Theatre of Manchester and made of it a repertory house, the first (as it was the first endowed theatre) in England. Her company was very successful, appearing in London at the Coronet Theatre in 1912-13 and giving there Stanley Houghton's *Hindle Wakes* and *The Younger Generation* and Galsworthy's *The Mob*.

HORN'ING, LETTERS OF. In Scots law, a writ which issues to compel a party to execute or carry out a judgment or decree of the court. The writ was formerly the only form of enforcing civil decrees by imprisonment. The process has been shortened, and other forms of execution are now more commonly employed. The title of the writ is derived from the ancient custom of denouncing a person disobeying the writ with three blasts of a horn. This was technically called "putting him to the horn."

HORNITOS, ōr-nē'tōs, or **HORNOS**, ōr'nōs (Sp., little ovens). The name given to the low oven-shaped hillocks which emit smoke and vapors, and which occur in great numbers on the sides and in the neighborhood of the large volcanoes of South America.

HORNPIPE. See BLACK GUM.

HORNPIPE. A lively English dance, originally in $\frac{3}{4}$, later in $\frac{4}{4}$ time. The universal peculiarity of the music was the length of the final note in each phrase. Its history can be traced back to the sixteenth century in England and to about 1740 in Scotland. During the eighteenth century it was widely popular, but since then it has been distinctively a sailor's dance. Chaucer speaks of the hornpipe as a musical instrument, but little is known about it. The general belief is that it was a rude instrument made from the horn of an ox. Consult H. Balfour, *The Old British Pipe and Hornpipe* (London, 1890), and F. Galpin, *Old English Instruments of Music* (Chicago, 1911).

HORNS. Under this term are commonly confused two very distinct structures forming outgrowths on the head of ungulate animals, to which order they are confined. The word ought not, strictly, to include the bony antlers of deer or the giraffe, since these, although to a certain extent epidermal outgrowths, consist of

true bone built up from blood deposits and are not at all transformed cuticle or "horn." Nevertheless, as Beddard points out (in *Mammalia*, London, 1902), the difference is one of degree rather than of kind. The simplest condition is seen in the giraffe, each of whose paired horns is a straight, bony outgrowth, the os cornu, originally separate from the skull, but becoming permanently fused with it early in life and is covered with wholly unmodified furry skin. In deer there is the same os cornu, which may here be branched and never becomes fused with the skull, but, on the contrary, is shed and renewed annually and is covered with a skin modified into "velvet" (see DEER) which decays and drops off as soon as the horn core (antler) is perfected. Between these two falls possibly the extinct *Suotherium* (q.v.), and certainly the modern pronghorn (q.v.). Here the bony core (os cornu) is fixed as in the giraffe, but begins to be branched as in the deer, and it is covered by a sheath formed of agglutinated hairs, the hairy skin beginning from the tip of the horn and proceeding downward, gradually transforming into perfect horn, which is shed and renewed annually. This is an isolated case, but connects the giraffe and deer with the Bovidae, or proper "hollow-horned" ruminants (Cavicornia). In this family the males of every species, and in most cases the females also, possess upon the top of the skull protuberances of bone into which air cells often extend from the frontal sinuses. These are called horn cores and form the support of the cornubus sheaths that cover and often extend far beyond them. They are not present at birth, for obvious reasons, but begin to grow immediately afterward. The horn sheaths grow with them and continue, even after they have reached normal size, to push out at the base as fast as they wear away at the tip. Their form and position on the head is characteristic of each group: round and lateral in the oxen, slender, retrocurved, or twisted, and somewhat compressed or sharply keeled in most antelopes, heavy, cross-ridged, triangular in section, and often spiral in the sheep and goats, and so on.

Evolutionists regard horns as in most cases a secondary sexual character. An examination of the fossil history of the tribe shows that these appendages have been gradually acquired, and it is only recently that the females of many forms, now provided with small horns, have acquired them by heredity. Moreover, castration or injury to the reproductive organs is likely to affect the growth and size of the horns. Lastly, among the deer, where the does (except in the reindeer) are hornless, these appendages are acquired just previous to the mating season and are dropped when the breeding season is over. Their service as weapons of defense and offense is therefore largely, if not primarily, in contests with each other for the supremacy of the herd—i.e., in the combative process of sexual selection. They are, nevertheless, in many instances powerful weapons in resisting and attacking outside enemies. The spearlike thrusts of the lowered horns of an enraged sable, or other large, long-horned antelope, are feared even by lions and leopards, which more than once have been killed by them. The goring power of a bull is irresistible. A heavy sheep, armed with its great horn coils, is a "battering ram," indeed, not to be despised. Many horns, however, seem to be ornaments rather than

weapons of value, or tools helpful in various ways, as snow shovels, for one pertinent example, among the remainder. Some of the great extinct ungulates of Tertiary time had very powerful horns, especially *Coryphodon* and the group of great Dinocerata, where in some cases a pair upon the forehead was supplemented by one or a pair on the snout. At present a ruling distinction between the artiodactyls and perissodactyls is, that in the former the horns are always paired and on the forehead, while in the latter they are set on the nose and are single or two in number, one behind the other. This is the case with the rhinoceroses, where the horn is a growth from the skin of the nose, composed of a solid mass of agglutinated hairs, based upon a knob of the underlying nasal bones.

HORNSEY, hōrn'zī. A suburban municipality of London, England, 6 miles north of St Paul's (Map: London, C 7). It is a favorite holiday resort, contains several parks, a public library and branches, museum, and public baths, and is chiefly composed of the homes of the working class, most of which are under municipal control. It was incorporated in 1903 with a mayor, 10 aldermen, and 30 councilors. Pop., 1901, 72,056. 1911, 84,592.

HORN SILVER. A term applied to the mineral cerargyrite (q.v.) on account of its waxy or resinous lustre.

HORN SNAKE. See HOOP SNAKE.

HORNSTONE. A variety of quartz, resembling flint, but more brittle, and having a structure that is more splintery. This variety of quartz is also frequently called *chert*. See QUARTZ, *CHERT*.

HORN'TAIL. One of a group of hymenopterous insects forming the superfamily Siricoidea. They are distinguished from the sawflies by the fact that the fore shanks have only one spur at the tip instead of two. They are called horn-tails because the end of the body with the adults usually bears a spine or horn. The ovipositor is fitted for boring, and the eggs are usually laid in the woody tissue of trees and plants. The larvæ feed beneath the outer bark. The group is not a large one, but contains a number of common and interesting species in the United States. The large pigeon tremex, e.g., is often a rather serious enemy to certain shade trees, such as the elm, sycamore, oak, and maple. The holes of this borer may be recognized by their regular, evenly cut shape. Another species is known as the willow-shoot horn-tail (*Phyllæus integer*) and does much damage by ruining the terminal shoots of osier-willow plantations in parts of the United States. The families included in this group are the Oryssidae, Siricidae, Xyphidridæ, and Cephidæ. Consult: L. O. Howard, *Insect Book* (New York, 1905), V. L. Kellogg, *American Insects* (2d ed., 1908); J. H. and A. B. Comstock, *Manual for the Study of Insects* (8th ed., Ithaca, 1909).

HORN'NUNG, ERNEST WILLIAM (1866-) An English novelist, born in Middlesbrough, Yorkshire. He passed two years (1884-86) in Australia. In 1893 he married a sister of Sir A. Conan Doyle. After returning to England he began a series of adventure novels. Among them are *A Bride from the Bush* (1890), *Irahe's Bushranger* (1896), *The Rogue's March* (1896), *The Amateur Cracksmen* (1899), *Dead Men Tell No Tales* (1899), *The Belle of Toorak* (1900), *The Shadow of the Rope* (1902), *Dennis Dent* (1903), *Stingaree* (1905), *A Thief in the*

Night (1905), *Mr. Justice Raffles* (1909), *Fathers of Men* (1912), *Witching Hill* (1913), *The Crime Doctor* (1914).

HORN-YHEAD. One of the most widespread and numerous of American minnows (*Hybopsis lentuchiensis*). It is a graceful, highly colored fish, 6 to 9 inches long, the fins all pale orange without a black spot, and the males in spring marked with a crimson spot on each side of the head. The distinguishing feature, however, is the tubercle-covered crest on the top of the head of the adults, and especially of the males in nuptial dress. It is a congener of the silver chub and is known as river chub, or jerker, in some places.

HORODENKA, hō'rō-dēn'ka. A town in the Austrian Crownland of Galicia, on an affluent of the Dniester, 33 miles north-northwest of Czernowitz (Map Austria-Hungary, J 2). It has an agricultural school, linen-weaving factory, potash and soap works, makes vinegar and brandy, and does considerable business in cereals. Pop., 1910 (district), 56,864.

HOROLOG'GIUM. The name given by the Greeks and the Romans to devices for measuring time. Consult the article "Horologium," in Smith, *A Dictionary of Greek and Roman Antiquities*, vol. 1 (3d ed., London, 1890). See CLEPSYDRA, *HOROLOG*.

HOROL'OGY (from Lat. *horologium*, Gk. *ὥρολόγιον*, from *ὥρολόγος*, *hōrologos*, telling the hour, from *ᾠρα*, *hōra*, hour + *λόγος*, *logos*, word, from *λέγω*, *legō*, to say). That branch of applied science that has for its object the measurement of time. Although it is easy to look back on a period when time, according to the modern conception of it, as measured by hours and minutes and seconds, was unknown, yet we find progress early made in the measurement of larger periods of time, by observations of the heavenly bodies, and although, in the later progress of astronomy, it is found that the movements of the more conspicuous heavenly bodies do not afford accurate marks for the equable measurement of time, they were, for practical objects, sufficient, and afforded at least a better measure of time than any other phenomena which came under the observation of mankind. Thus, time was early divided into years, according to the motion of the sun among the constellations, into months, according to the motion of the moon relatively to the sun's place in the heavens, and into days, by the alternate light and darkness caused by the rising and setting of the sun. It was long, however, before any accurate measure was found for a division of the day itself. The earliest measure employed for this purpose that we can trace is the shadow of an upright object, which gave a rough measure of time by the variations in its length and position. This suggested the invention of sundials. Another means early adopted for the measurement of short periods of time was by the quantity of water discharged by dropping from one vessel into another. Instruments for measuring time on this principle were called clepsydræ (see CLEPSYDRA). The running of fine sand from one vessel into another was found to afford a still more certain measure, and hence the invention of the hour-glass (q.v.). King Alfred is said to have observed the lapse of time by noting the gradual shortening of a lighted candle. It is not very easy to trace to its source the history of the invention to which the modern clock owes its

parentage the earliest clock, however, of which we have a complete description, and perhaps the earliest which attained any distinct superiority over the rude contrivances already mentioned, was the clock of Henry Vic (De Vick or De Wyck), a German, erected in the tower of the palace of Charles V, King of France, in 1379.

For the description of this first mechanical timekeeper, and for the subsequent history of clock and watch making, see CLOCK WATCH PENDULUM, ESCAPEMENT. The history of the science of horology and of the mechanical art of the clock, watch, and chronometer maker are so intermingled that they cannot be considered separately. They may therefore be found under these heads. See also TIME, STANDARD, TRANSIT INSTRUMENT.

HOR/OSCOPE (Fr *horoscope*, from Lat *horoscopus*, from Gk *ὠροσκοπεῖν*, *hōroskopein*, *ōroskōpeion*, *hōroskopion*, horoscope, from *ὠροσκόπος*, *hōroskopos*, one who observes the hour of a birth, from *ὥρα*, *hōra*, hour + *σκοπεῖν*, *skopein*, to view). In astrology, strictly speaking, that part of the ecliptic which is ascendant or rising in the east at the moment of an occurrence whose outcome is to be calculated, such as the birth of a child, thence, more generally, the figure of the heavens, constructed with this as starting point, on which the subsequent predictions are to be based. See ASTROLOGY.

HORR, GEORGE EDWIN (1856-) An American Baptist theologian, born in Boston. He graduated from Brown University in 1876 and studied at Union Theological Seminary (1876-77) and at Newton Theological Institution (BD, 1879). Ordained to the Baptist ministry, he held pastorates at Tarrytown, N Y (1879-84), and at Charlestown, Mass (1884-91), from 1891 to 1903 was editor in chief of the *Watchman*, and thereafter was professor of Church history at Newton, and after 1903 also president. He became president of the Watchman Publishing Company and contributing editor of the *Watchman-Examiner* and is author of *God in the Heart* (1903), *The Training of the Chosen People* (1907), *The Great Ministry* (1908).

HOR/ROCKS, or **HOR/ROX**, JEREMIAH (c1617-41). An English astronomer, born at Toxteth Park, near Liverpool. He entered Emmanuel College, Cambridge, in 1632 and remained there until 1635, devoting himself principally to the study of astronomy. In the latter year he returned to Toxteth and commenced, under extremely unfavorable circumstances, his original observations. In 1639 he was appointed to the curacy of Hoole, Lancashire, and in that village, on Nov 24, 1639 (O S), he made his famous observation of the transit of Venus—the first observation of this phenomenon ever made. Hearne, in his memoranda, tells us how Horrocks was called away, during his observation of the transit, "to his devotions and duty at church," the day being Sunday. Newton, in the *Principia*, bears honorable testimony to the value of Horrocks's astronomical work, especially commending his lunar theory as the most ingenious yet brought forward, adding, "and if I mistake not, the most accurate of all." Horrocks is frequently mentioned by the scientific men of the seventeenth century, the observation of the transit is by no means regarded as the most important of his astronomical achievements. He died suddenly at the age of about 23,

on Jan 3, 1641. Hevelius printed Horrocks's Latin treatise entitled *Venus in Sole Visa* in 1662. In 1672 Horrocks's fragmentary works were published under the auspices of the Royal Society, being edited by Wallis, with the title *Jeremiae Horroccii Opera Posthuma*, etc. Other works of Horrocks's perished in manuscript. Consult Wharton, *Memoir of the Life and Labours of the Rev J Horrox* (London, 1859).

HOR/SA. See HENGEST.

HORSE (AS *hors*, OS, Icel *hross* OHG *ros*, Ger *Ross*, possibly connected with Lat *cursus*, to run, less probably with Skt *lāṇḍ*, to spring, Gk *ῥοπαῖς*, *ropai*, wanton dance, or with AS *hrēodan*, OHG *rusten*, Ger *rusten*, to adorn). The term is usually applied only to the domestic horse (*Equus caballus*), but it is also sometimes used as a general term for other members of the Equidae (q v), which include the ass, quagga, and zebra. The characteristics which distinguish the horse from its nearest relatives are the long mane, the long hairs at the base of the tail, and the callosities on the inner side of the hind legs just above the hock.

There are two general types of horses (1) the northern dun, which includes the dun pony of Norway, the Celtic pony, and the wild pony of Mongolia, and (2) the southern, which includes the Arabian, Barb, and thoroughbred. The horse was domesticated in Asia long before the Aryans migrated to Europe, but was a later acquisition than the ox. The wild horse furnished abundant food for man in Europe during the Neolithic period, but had been domesticated before Cæsar went to Britain.

Professor Ewart believes that at least four wild species have contributed to the making of modern breeds. (1) *Equus robustus*, adapted for a forest life, (2) *E przewalskii*, the steppe horse, which still exists in a wild state, (3) *E agilis*, specially adapted for life on plateaus and deserts, (4) *E sivalensis*, the Sivalik horse, that lived in the upland valleys of northern India. For early use by man, see PALEOLITHIC PERIOD. According to the inscriptions on monuments the horse was introduced into Egypt at the time of the Shepherd kings. His use, however, was very limited, both the Egyptians and Assyrians confining the use of the horse to warfare. Subsequently, however, his services to man increased, and he became an emblem of rank and an object of luxury or sport as well as an aid in war.

The speed of a horse is its greatest asset because it is its chief value to man. It is the recognition of this value that has been the important factor in the evolution of the horse, an animal especially plastic in the hands of the breeder. His size, form, action, and instincts are subject to modification to a degree unknown in that of any of the other larger species. During his early history modifications of type were due to the changing conditions of warfare, but to-day the principal variations of type are to a far greater extent due to the exigencies of commerce or the demands of sport. It has been suggested that the different breeds of the modern domestic horse have been developed out of the interbreeding of several original wild species; this, however, is only conjecture. What is known is that domestic breeds have existed in Europe from prehistoric times, and also that they have been improved continually by blending with Oriental horses.

Arabian horses are divided into three classes, which have been recognized as subbreeds since

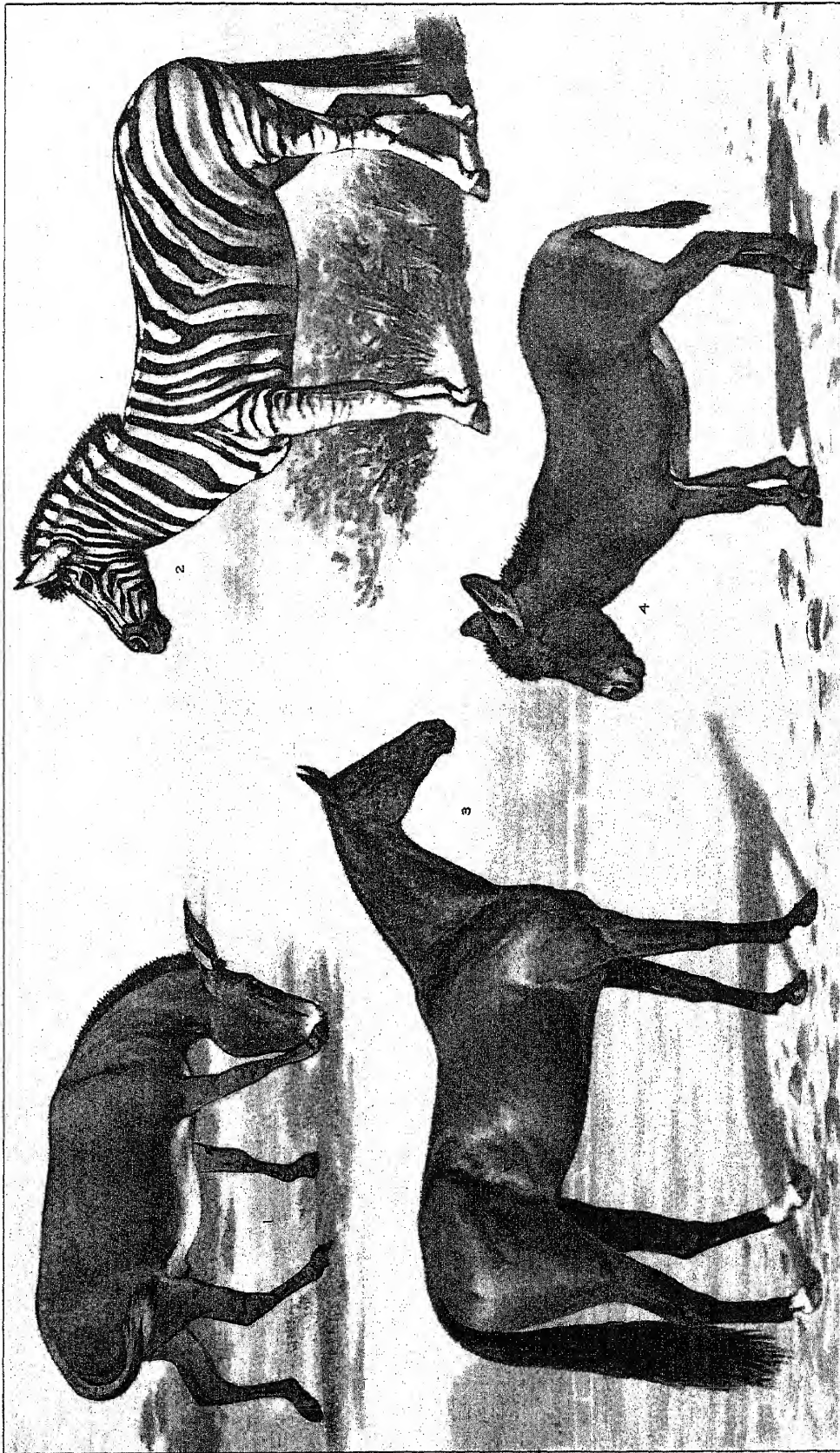
the fifteenth century. The genuine Arabian is found in the region from Damascus to the Tigris as well as in Arabia proper. The breed is found in its greatest purity and excellence in the stables of the Sultan of Turkey. The Turk, or Turkish horse, found in portions of European Turkey, but principally in Asia Minor, was of considerable importance in the seventeenth century, but it has deteriorated very much since then. The Barb is a native of the Barbary States, whence its name. It is found in greater perfection among the Moors, who introduced the Barb blood into Spain during their rule in that country and so improved the Spanish horse that for several centuries it occupied the first place throughout Europe. Spanish horses of this stock brought to America by the Spaniards are regarded as the progenitors of the mustangs and the other wild breeds common to Mexico and California. (See section on *The Horse in America*.) About the middle of the sixteenth century Italian and Spanish horses (the former heavy types, and the latter, owing to their Barb blood, very much lighter and fleet) were in the greatest demand. It is during this period that horsemanship (qv) began to be studied as a science, the first book concerning which was published by Grisoni in Italy in 1552. The Italians were also the first to take up the teaching of horsemanship as an accomplishment, after which riding came into vogue throughout western Europe. The English thoroughbred is spread over a larger portion of the earth to-day than is that of any other breed. It is used more than any other to improve the blood of horses of general utility throughout the world, and, according to statistics, more capital is influenced by it than by any other two or three breeds combined.

The history of English horse breeding has been divided into three periods: the first extending from the earliest records to the end of the sixteenth century; the second from the accession of James I to the first year of the *Stud Book* (qv), 1791 (in which period the thoroughbred came into existence), and the third period extending to the present time, in which the thoroughbred has become a clearly defined as well as a pure breed. The original British horse was a small pony, shaggy and hardy and rarely more than 14 hands high, but the importation of stallions from Spain, Italy, and France improved the breed from time to time. During the Crusades and the consequent general use of heavy armor, which continued up to about the year 1600, large horses came into vogue. A knight in armor, together with his horse accoutrements, weighed from 350 to 425 pounds, so that during the age of chivalry all breeding was directed towards improvements in the size of the horse. Stallions under a certain size were condemned by law, and, in 1217, 100 stallions were imported from Normandy, and for nearly 500 years subsequently size was sought for rather than speed; thus laying the foundation of the different modern breeds of British draft horses. What was the case in England was equally so with the nations of western Europe and their horses, so that the horse of this period is particularly remarkable for its broad chest, heavy neck, and round buttocks. With the appearance of gunpowder and firearms, and the disappearance of armor, these breeds became useless for the purpose of warfare, which now demanded fleetness as a first essential. They passed, however, to a greater sphere of usefulness and to-day constitute the heavy draft breeds

known as the Dutch and Flemish, the Percherons (qv) of France, the Clydesdale of Scotland, and the cart and shire horse of England. See *SHIRE HORSE*.

Before the days of the tournaments in England large horses were scarcely known, but the needs of the knights compelled the keeping of a sufficient number, so that by intermixture with smaller native animals the size of the British horse gradually increased, but the result proved that, although they were bigger, they did not nearly possess the qualities of the smaller horse. During the Crusades the excellence of the Saracen horses deeply impressed the British Crusaders, who brought many Asiatic horses with them on their return to England. The Eastern horses were Barbs, Turks, Arabs, and Persians, not more than 14½ hands high, and it is to them that the English horse owes in part its present conspicuous qualities. Laws were passed to promote the breeding of large horses by improving the type of British ponies. During the reign of Henry VIII it was ordained by law that no stallion less than 15 hands and no mare less than 13 hands should run wild in the country. Colts two years of age and under 11½ hands high were not permitted to run on any moors, forests, or commons where mares were pastured, and to guard against any mishaps it was further ordered that at Michaelmas the magistrates of the neighborhood were to search the countryside, the forests, and the commons, for the purpose of destroying all stallions under the required height, as well as "all unlikely tits, whether mares or foals." Prelates and nobles, and every one whose wife wore a velvet bonnet, were compelled to do then "leaping and riding upon stallions not less than 15 hands high." There were two classes of horses throughout the country—the first a "very indifferent, strong, slow, heavy draft horse," and the second "light and weak." Private matches were often arranged, showing that speed was becoming a greater factor than size and weight.

Although there had been public horse racing in Elizabeth's time, it was not until James I ascended the throne that horse racing was legally established. He introduced into England the Markham Arab, which was known to be a purebred animal, and in many other ways did much to improve the breed of horses. A distinction was drawn between race horses and common horses, the race horses were trained for their competitions, and 140 pounds was the average weight of a professional jockey. During the reign of Charles I a memorial was presented to the King bewailing the gradual disappearance of stout horses fit for the defense of the country, by stating that the breed of strong horses was likely to disappear unless measures were taken for their propagation. The tournament was no more, the pack horse had practically disappeared, the introduction of the coach had removed a large part of the pack from the horse's back, and everything was done to encourage cross breeding with foreign importations. From such ancestors the modern thoroughbred has descended. After the civil wars and during the reign of Charles II the race courses at Newmarket and at Datchet Mead, near Windsor, were laid out, and the King himself became the first great supporter of the turf. The most conspicuous English horseman of this time was the Duke of Newcastle, who in 1667 published his celebrated work on horsemanship, the reading of which is said to have so im-



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- 1 WILD ASS - EQUUS ASINUS
- 2 BURCHELL'S ZEBRA - EQUUS BURCHELLI
- 3 HORSE (THOROUGH-BRED)
- 4 DOMESTIC DONKEY

JULIUS BIEN & CO LITH. N.Y.

terested Charles that he became the largest individual importer of foreign blood in the country. The Stuart kings maintained magnificent studs and constantly employed purchasing agents to secure the best Oriental blood but, unfortunately, the pedigree of many of these animals is largely a matter of tradition, owing to the fact that the *Stud Book* had not been issued. In spite of the infusion of foreign blood, however, the English race horse in the time of the Stuarts was a clumsy-looking animal in comparison with the pure Oriental type or with the race horse of to-day. He was strong and of large build, but neither as elegant nor as swift on the racecourse as was the Barb. The combination of native English stock and such horses as the Helmsley Turk, Byerly Turk, Pace's White Turk, D'Arcy's White Turk, Selaby Turk, and by such Barbary stallions as Dodsworth, Carwen, Bay Barb, Greyhound, Compton Barb, and Toulouse Barb, produced a horse remarkable for its well-proportioned locomotive parts, legs, shoulders, etc., strong carcass and deep chest, the typical animal of speed and endurance.

Since the middle of the eighteenth century the practice of interbreeding with Oriental blood has been discontinued, and although half-bred horses were raced until the first part of the nineteenth century, the thoroughbred has, ever since the foundation of the "racing calendar," been the recognized race horse, and his pedigree has been strictly and authentically kept. During the seventeenth century speed was not the sole qualification of a race horse, it was required to have strength and endurance. From racing matured horses at long distances it was an easy transition to shorten the length of the course and increase the speed of the horse, besides which the element of gambling entered into the sport, and it soon happened that three-year-old horses were used in the races. It was found, however, that they could not "stay" the old four-mile course, so that of necessity the distances had to be reduced to accommodate the horses. The result of this policy is seen in modern horse racing (qv), in which two-year-old horses developed for speed alone take part in races over courses less than half a mile in length.

The Horse in America. Fossils of the fore-runner of the horse have been found on the American continent, but it is generally believed that the American horse of to-day is the descendant of animals brought here by Europeans and the first settlers. Cortés used but few horses in his Mexican conquest, but undoubtedly some of them became progenitors of the American wild horse and similarly the horses abandoned by the unfortunate Ferdinand de Soto near the Texas border became the progenitors of all the wild horses of North America. Recent discoveries of fossils in South America have led some to believe that at least one type of South American horse is indigenous. (See HORSE, FOSSIL.) The character and action of the American horse will be found fully described under THORNTON and PACER.

The earliest colonists of Virginia were not remarkable as pioneers, so that it is not surprising to learn that their first supply of domestic animals (including horses) was consumed as food. Although there had been several shipments of horses from London down to about 1640, in 1646 there were only between 200 and 300 horses of both sexes in the Colony. In 1656 the exportation of mares was prohibited by law,

but in 1667 the restriction was removed. The horses of the period are described as having been of hardy and strong quality, but undersized, and, like the horses in other Colonies, they were branded and turned loose to find their own subsistence. Owing to the rapidity of their increase, they were soon very numerous and became practically wild, so much so that at the close of the seventeenth century it was as common as well as profitable sport to hunt wild horses, for an animal without a brand became the property of its captor. On the island of Chincoteague, off the coast of Virginia, there are still in existence bands of wild horses, and only within recent decades has there been any attempt to domesticate any of their number. They are of all colors and uniform in size, not averaging over 13 hands, and are accounted for in their present location as being the descendants of a band of Virginian wild horses which located there when it was a peninsula and had their retreat cut off when time converted what had been a peninsula into an island. Notwithstanding occasional efforts to increase its size, the Virginian horse retained the characteristics of its English ancestor.

The settlers of New Netherlands brought their horses from Utrecht. They were larger, better, and more valuable, so far as prices were concerned, than the English horses of the other Colonies, but were not regarded as being as good for saddle work. The two breeds soon intermixed, and a larger breed resulted, for at the time of the Revolution the average height was 14 hands and 1 inch. Horse racing was introduced by Governor Nicholls, of New York, in 1665. He established a racecourse on Hempstead Plains, L. I., which was the first official and properly organized racecourse on the continent. It is supposed that the horses were of the Dutch breeds, because the people attending were largely of that nationality. The English race horse was not at that time thoroughly developed and in any case was not imported into New York until nearly 100 years afterward. The New England Colonies played a very important part in the development of the modern American horse. In 1629 the first horses were imported into New England from the proprietary company in London. In 1635, 27 mares and 3 stallions were shipped from Holland and sold in Salem, and five years later conditions were such that the colonists were enabled to export a shipment of 80 animals to Barbados. It has been ascertained, from an investigation covering the period 1756-59, that the average height of horses was 14 hands 1 inch, and that three-fourths of the total number were pacers and one-fourth trotters. The founders of Hartford, Conn., brought horses with them (1636), and in 1653 the General Court at New Haven ordered all horses to be branded and instituted a system of public saddle horses for hire. The average size was 13 hands and 3 inches. Roger Williams and the settlers of Rhode Island Colony (1636) obtained their horses from Massachusetts and succeeded so well in the breeding of them that in 1690 horses were their principal export, and they shipped them to all the Colonies of the coast. Pacers were raised in Rhode Island and were widely known as Narragansett pacers. Trade with Canada was not permitted, but there is no reason to doubt that an occasional trade was made, whereby a Narragansett pacer changed owners for the consideration of a bale of peltry, such as only the French Canadian could offer.

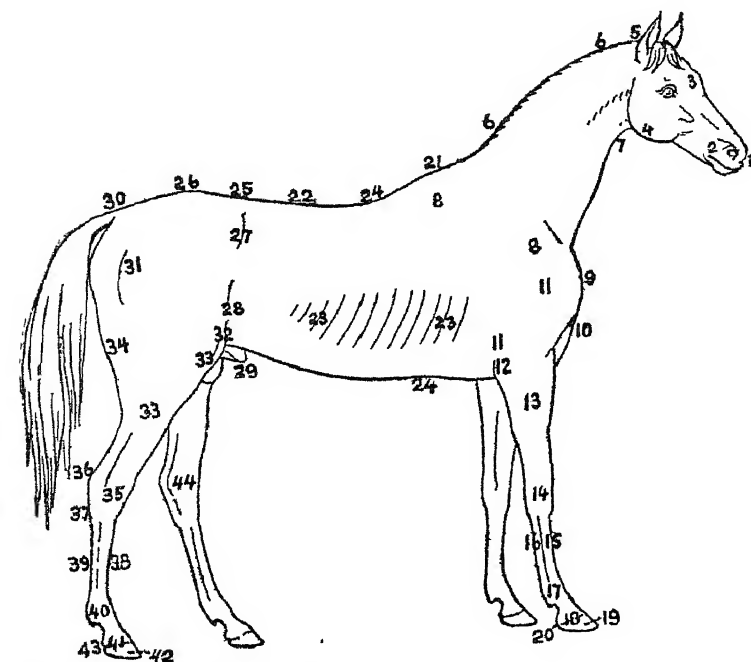
Racing was especially encouraged in Rhode Island, and thus was developed the speed that made then horses famous. In 1768 the average size of a Narragansett was 14 hands and 1 mch. In the early part of the seventeenth century the Pennsylvania horse was the largest and heaviest horse in the country, but 100 years later they seem to have ranked in both respects below the horses of all the other Colonies. Up to 1750 the average size in eastern Pennsylvania was about 13 hands and 1½ inches. Philadelphia boasted the speediest and finest horses, and pacers were the most fashionable and popular. New Jersey supplied itself from New York and Pennsylvania,

a stallion, Justin Morgan, that was foaled at Springfield, Mass., in 1793.

The American horse was for 200 years the sole means of inland travel and the great essential to all business in and between the various Colonies of the country. Improved roads have made him a driving horse, and none of the inventions of modern times, from the introduction of railroads to bicycles and horseless vehicles generally, has affected his popularity or his value. To the superficial observer it would appear as if improved means of vehicular transport would diminish the breeding of horses as well as decrease their value, but thus far such has not been the

case. Good horses have a higher value than ever, and as the demand for cheap or poorly bred horses diminishes, the better bred ones survive, and what is lost in number is more than balanced in breed and consequent value. (See BREEDING.) The principal families of racing horses are the Bashaws, Clays, Black Hawks, Hambletonians, Mambrino Chiefs, Pilots, American Stairs, and Blue Bulls. (See TROTTER, PACER.) The most prominent types of the pony include the Shetland, Galloway, Welsh, Dartmoor, Exmoor, and Canadian breeds. (See PONY.) See also ASS, MULE, SHIRE HORSE, PERCHERON HORSE, ETC.

Types, etc. The *hackney* is, strictly speaking, not a breed, but a type, indigenous to the eastern counties of England, bred chiefly for carriage purposes. It is of excellent symmetry of proportion and is capable of a very true rhythm in action, although it is slower and heavier than the roadster, it is faster and much lighter than the middle-weight draft



HEAD—1, muzzle, 2, nostril, 3, forehead, 4, jaw, 5, poll

NECK—6, crest, 7, throat, or windpipe

FORE QUARTER—8, shoulder blade, 9, point of shoulder, 10, bosom, or breast, 11, true arm, 12, elbow, 13, forearm (arm), 14, knee, 15, cannon bone, 16, back sinew, 17, fetlock, or pastern joint, 18, coronet, 19, hoof, or foot, 20, heel

BODY OR MIDDLE PIECES—21, withers, 22, back, 23, ribs (together forming the barrel, or chest), 24, 24, circumference of chest, called the girth, 25, the loins, 26, the croup, 27, the hip, 28, the flank, 29, the sheath, 30, the root of the dock, or tail

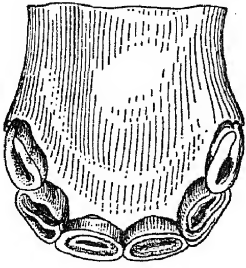
HIND QUARTER—31, hip joint, or whorlbone, 32, stifle joint, 33, lower thigh, or gaskin, 34, the quarters, 35, the hock, 36, point of the hock, 37, the curb place, 38, the cannon bone, 39, the back sinew, 40, pastern, or fetlock joint, 41, coronet, 42, foot, or hoof, 43, heel, 44, spavin place

and by the beginning of the eighteenth century racing had become so common as to be a nuisance, so much so that in 1748 there was enacted a law for the suppression of "running, pacing, and trotting races." The year before the Colony of Maryland, which had in all probability received its supply of horses from Rhode Island, Pennsylvania, and Virginia, passed a similar law. North and South Carolina secured then horses from Virginia. In Canada horses were received from Picardy, France, in 1665, and it is assumed they were largely of the English type. Many of them are supposed to have been pacers, but whether they were, or whether, as is sometimes argued, the Canadian pacer is derived from the illicit trading with Rhode Islanders for their Narragansetts, is a question much discussed. The Morgan horse is a type which has had deserved popularity. It originated from

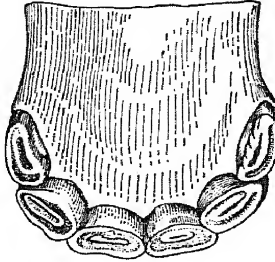
horse. A well-bred hackney should be properly balanced in fore and hindquarters and middle piece. Since 1890 there have been large importations of this breed to America, although the hackney has been known here by occasional single importations since 1822. It has been especially valuable in the breeding and development of the American trotter. The *cob*, another useful type, is a native of Norfolk and Lincolnshire in England and is a stoutly built, short-legged animal of from 13.3 to 14.3 hands high. It is smaller than the hack and larger than the pony. The *Galloway* is a horse common to Wales and North Britain. It seldom ranges above 14 or 14½ hands in height and is not a particularly valuable animal. Specimens below 13 hands are called ponies. The *hunter* is not required to be a thoroughbred animal, although where the hunting warrants it he is

HORSE

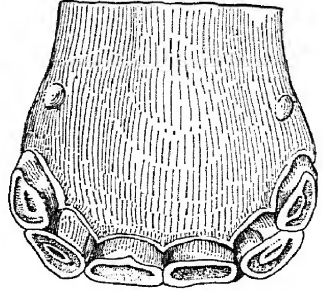
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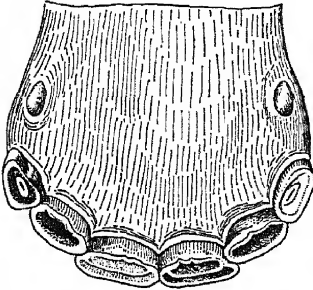
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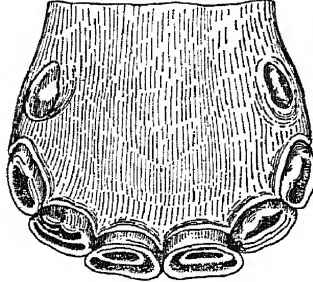
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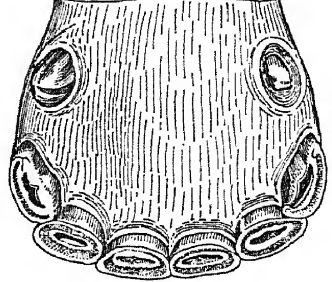
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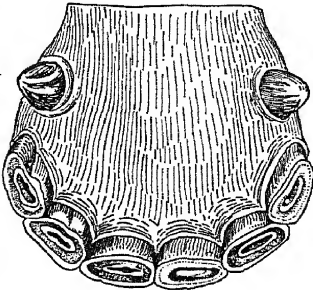
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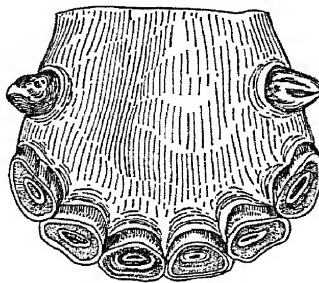
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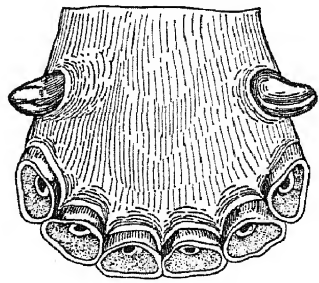
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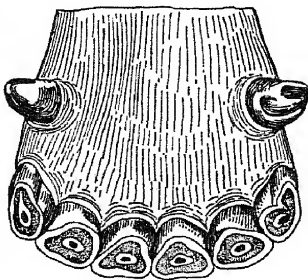
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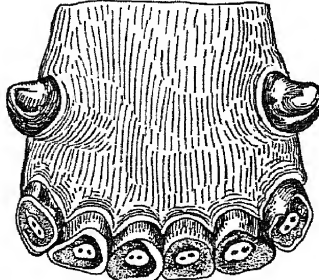
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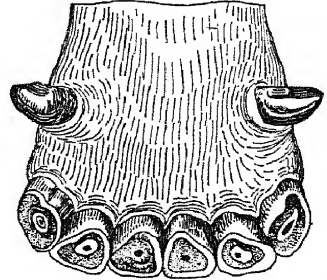
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AGE-MARKS ON THE TEETH OF THE HORSE

1. One Year Old.
2. Two Years Old.
3. Three Years Old.
4. Four Years Old.

5. Five Years Old.
6. Six Years Old.
7. Seven Years Old.
8. Nine Years Old.

9. Eleven Years Old.
10. Thirteen Years Old.
11. Fifteen Years Old.
12. Seventeen Years Old.

frequently thoroughbred, or half bred at least. He is chosen to suit the country over which he is hunted as well as to carry the weight of his rider. In any case he should have the following characteristics: a lean head and neck, firmly set on good oblique shoulders; a strong back and loin, deep body, wide hips, good quarters, and firm legs and feet. Among horse-men the following terms are in use: A *stallion* is a male horse, and when desexed is termed a *gelding*. A *mare* is the female. Animals of both sexes when young are termed *foals*, the male foal is a *colt*, and the female a *filly*. Young animals become "of age" when the outer incisors (corner nippers) are developed. A horse is *aged* when in its eighth or ninth year, a fact determined by the front teeth. The period of gestation is 11 months, the foal usually being dropped in the spring.

Indications of Age. It is very difficult, if not impossible, to formulate any rules by which the age of a horse may be accurately determined. To an expert horseman the lightness and elasticity of step of the animal under examination will afford a general clew, or, better still, the contour of the lower jaw, which grows more and more angular with increasing age. It is to some structure of the animal little liable to change, however, that we must look for any very accurate gauge, and the only structure answering that requirement is that of the teeth, which must be examined according to the following rules. The six teeth, or nippers, situated in the front of the lower jaw, are the ones examined to determine the question, although the tushes are a partial indication and are sometimes used in arriving at a decision. In this article the two middle nippers will be referred to as the central nippers, the ones on each side of these as the middle nippers, and the ones at each end of the group as the corner nippers. At two and a half years of age the permanent central nippers are just through the gum, the temporary middle and corner nippers still remaining, one year later the permanent middle nippers are in evidence, and between the fourth and fifth year the corner nippers will be through. About this time changes will be noticed in the condition of the earlier teeth, e.g., the middle pair look as the central pair did at two and one-half years, and the central nippers are showing signs of wear. Between the ages of five and nine considerably more experience is necessary for an accurate judgment than has been required before. At nine years of age the previous oval shape of the teeth becomes more triangular, at 10 the central nippers take a pronounced triangular shape, and the middle pair give evidence of a like tendency, followed at 11 years by the growth of the corner nippers in the same direction. The tushes become rounded at the points, and the nippers are longer and project more, the central nippers being completely triangular. The signs of wear and tear, and the growth of the evidences already described, continue with increasing age, so that at 20 years the nippers are all exceedingly triangular, projecting forward to a great degree, and are very long.

The Character, or temperament, of a horse cannot be discerned short of actual experience, by any known formula or given rules; for while the experienced horseman may judge approximately by noting the shape of the face and head and the expression of the eyes, he will, as a rule, be unable to explain the method or rules upon which

his conclusions are based. Like men horses are of different dispositions and exhibit such varied characteristics as pride, dignity, intelligence, stupidity, courage, cowardice, etc. Generally stated, an intelligent horse shows considerable width between the eyes, which latter are very prominent. The width between the ears is taken to indicate courage and strength of character, and roundness and elevation between the eyes as denoting a mildness of disposition. A timid horse is usually narrow between the ears, and a stupid one narrow between the eyes.

Diseases of the Horse. No other domestic animal is so large a sharer with humanity in the accidents and dangers incident to modern civilized life as the horse. It is practically a co-partner with man in every detail of his life and work, and yet no other animal suffers so much from ignorance, abuse, maltreatment, and quackery. Modern civilization is doing much to alleviate the condition of the less fortunate of his kind, notably the various societies for the prevention of cruelty to animals. (See CRUELTY TO ANIMALS, PREVENTION OF.) The practice of veterinary medicine has become one of the most exacting and advanced of professions, and diseases long considered incurable are now amenable to treatment. In European countries the horse is an object of governmental solicitude, as much for his value as a factor in warfare as for purely humanitarian reasons, and a careful census record is kept (particularly in Germany) of the number, pedigree, and value of the horses throughout each country. The government of the United States, through its Department of Agriculture, alone of all the nations of the world has compiled a special *Report on the Diseases of the Horse*, which is published as a guide and aid in the cultivation of a proper knowledge of the care and treatment of the animal. Below are described some of the more prevalent diseases, which will be found more fully treated in the above-named publication. See also DISEASES OF ANIMALS.

The Teeth.—Dentition covers the period during which the young horse is cutting his teeth, usually from birth up to the age of five years. As a rule, the horse has more difficulty in cutting the second, or permanent, teeth than he has with his first, or milk, teeth. With regard to the latter the mouths of young horses should be frequently examined in order that the milk teeth may not remain too long and thus cause the permanent teeth to grow in crookedly. Toothache is rare with the average horse, and then only where a tooth is allowed to decay. Usually it is only observed in the molar teeth and may be discovered by the evidences of pain given by the horse when feeding or drinking cold water.

Diseases of the Mouth.—1 *Lampas* (qv) . a swelling of the mucous membrane of the hard palate, projecting in a more or less noticeable ridge immediately behind the upper incisors. 2 *Stomatitis* . an inflammation of the mucous membrane of the mouth, generally produced by irritating medicines, foods, or other substances, such as often follows in the case of city horses from eating out of ash barrels. 3 *Glossitis* an inflammation of the tongue very similar to stomatitis both in origin and in symptoms. 4 *Ptyalism*, or salivation, is an abnormal and excessive secretion of saliva, often caused by irregular teeth, inflammation of the mouth or tongue, or the use of medicines, and occasionally by the eating of second-crop clover. 5 *Pharyngitis*

(qv) an inflammation of the mucous membrane lining of the back part of the mouth, or pharynx 6. *Paralysis of the pharynx*, or, as it is more generally called, paralysis of the throat, is a disease first discovered from the fact that the animal is unable to eat, and the manger is found to contain much saliva and frothy food that has been returned through the nose

Diseases of the Esophagus, or Gullet—It will be found in the vast majority of instances exhibiting these diseases that the cause is the introduction into the organ of foreign bodies too large to pass, or else that there are present erosions and ulcerations of the throat (followed by constriction or narrowing of the gullet) caused by the administration of caustic medicines not thoroughly diluted. The designations "pharyngeal," "cervical," and "thoracic choke" are used to denote where the obstruction is located, the symptoms varying according to the position of the agent responsible for the choke

Diseases of the Stomach—1. *Stomach staggers* (see STAGGERS), or gorged stomach (*Impaction*) distention of the stomach caused by food, in which the stomach loses the power of contracting upon its contents 2. *Tympanites of the stomach* a disease corresponding to that of "hoven" or "bloat" in cattle, and frequently due to the overloading of the stomach with young, succulent herbage, which, after its arrival in the stomach, liberates quantities of fermentation gas sufficient to distend the stomach seriously Overfeeding is a very frequent cause of stomach bloat, particularly if the overfeeding is followed immediately by hard work The symptoms are very much the same as for stomach staggers, and the treatment must be at once vigorous and immediate. As a rule, cases of this trouble occur away from the stable Absorbents are of some service, and charcoal may be given in any quantity Chloral hydrate in doses of one ounce in a pint of water as a drench is well adapted to the treatment of wind colic Diluted alcohol or whisky or aromatic spirits of ammonia may be given in one-ounce doses at short intervals 3. *Rupture of the stomach* powdered opium in one-dram doses may be given every two or three hours, thus keeping the stomach as quiet as possible The case should be kept under the observation of a skilled veterinarian 4. *Bots* there are so many opinions extant concerning this disease, many of which are erroneous, that it will repay any owner of stock to make a careful study of it With regard to the insect itself, see BOT, GADFLY Of the numerous insect parasites on solipeds, the gadflies (*Estridæ*) are the most important The species responsible for the above-named disease infest chiefly the stomach and duodenum—the small gut leading from the stomach Nearly all country horses, as well as those experiencing their first year in the city, have the bots, but the common opinion that bots frequently cause colic pains is erroneous, although they may occasionally do so If in large enough numbers they may sadly interfere with digestion. The animal may not thrive and emaciation may follow, but beyond this they are harmless 5. *Indigestion* indigestion is imperfectly performed digestion, which in the horse causes symptoms closely resembling those of dyspepsia in man A great cause of indigestion with the horse is found in the food itself (See section on *Care of the Horse*) The teeth are in many instances to blame, their sharp, irregular, or decayed condition preventing any perfect

mastication, and causing the animal to swallow his food before it receives the requisite admixture of saliva The principal seat of indigestion is in the stomach or small intestine It is characterized by an irregular appetite, refusal of food or gorging, and a disposition to eat unusual substances, as wood, salt, bedding, and frequently his own feces The animal loses flesh, and the skin becomes hard and dry and hidebound The treatment usually consists of a careful regulation of food as regards quality, quantity, and time of feeding, and an exercise of similar care as regards the water supply The condition of the mouth and teeth must also be attended to, and the teeth if sharp or irregular must be rasped down, or extracted if decayed If the indigestion is caused by ravenous eating, the animal should be fed from a manger sufficiently wide to allow the spreading of the grain, which will usually compel the horse to eat slowly Frequently a cathartic is given at the outset

Intestinal Worms—Worms are very frequently found in young horses as well as in those that are weak or debilitated They almost invariably exist in horses pastured on low, wet, or marshy ground as well as in those that drink stagnant water The most common form of intestinal worm is the lumbricoid worm, which closely resembles the common earthworm It is white or reddish in color, measuring from 4 to 12 inches in length and varying in thickness from the size of a rye straw to that of a cigar, being thickest at the middle and tapering towards each end At first slight colicky pains are noticed, or a vigorous switching of the tail, and frequent passages of manure, the animal does not shed its coat and is hidebound and pot-bellied He will be particularly fond of salt and will bite at the woodwork of his stall, the bowels are irregular, either constipation or diarrhœa being present Among the best medicines for worms are santolin, turpentine, tatar emetic, infusion of tobacco, and bitter tonics Whatever remedy is given, it will be found much more effective if administered after a long fast, and then the worm medicine must be supplemented by physic to force out the worms There are many varieties of worms, the treatment for which is usually along the lines above described

Spasmodic, or Cramp, Colic is the name given to colic which is produced by contraction or spasm of a portion of the small intestines It is usually caused by indigestible food, foreign bodies, excessive drinking of cold water when overheated, drafts of cold air, etc To insure correct treatment, it is very necessary to keep in mind the type of horse, the force of the attack, the intervals of ease or violent pain, the temperature and pulse, and a frequent attempt to urinate, which will prevent the confounding of this with any other form of colic The treatment indicated is any antispasmodic medicine, of which probably there is none better than chloral hydrate given in a dose of one ounce in a half pint of water as a drench *Flatulent colic, tympanites, wind colic, bloat*, are common among animals subject to sudden changes of food, careless feeding or treatment, too much green food, or any other food that has become stale and sour See ENTERITIS

Hernia—There are several kinds of herniæ, not all of which, however, are to be regarded as serious or dangerous Abdominal herniæ, or ruptures, are divided into reducible, irreducible, and strangulated, according to their condition, and

into inguinal, scrotal, ventral, umbilical, and diaphragmatic, according to their situation. In many instances treatment is not necessary, or, where the hernial sac is extensive, treatment is ineffective. A good deal will depend on whether any one is present when the hernia happens, as to the possibilities of a perfect cure. Umbilical hernia, or diaphragmatic hernia, calls for the most skilled treatment, and even then little or nothing can be done.

Acute Inflammation of the Kidneys—The causes of this disease are many and varied. Congestion occurs from retained products passed through the kidneys during recovery from inflammation of other parts, or fevers. Detained urine, and the possible production of ammonia and other irritants, are also frequent causes. The symptoms consist of fever, stiffness of the back, straddling gait, difficulty in lying down, rising, or walking in a circle. The recognized treatment is as follows: removal of any cause that can be discovered, then, if suffering from high fever, the removal of from two to four quarts of blood, which should be followed as much as possible by throwing the work of the kidneys on the bowels and skin.

Catarh, or Cold in the Head—A fluid discharge from the mucous membrane. Inflammation, as a rule, extends to the membrane of the sinuses of the head, and of the larynx and pharynx, causing the added complication of sore throat. Frequently the eyes are also affected. At the first stage of the attack the membrane is dry and irritable, followed by a watery discharge from the nostrils. Fever, more or less, makes its appearance, which is usually detected by placing a finger in the animal's mouth. In itself the disease is not very serious, but if neglected or treated wrongly may become complicated and dangerous. A few days of cessation from work, together with pure air and good food, is regarded as the best treatment.

Roaring (qv)—A chronic disease, evidenced by a loud, unnatural noise in breathing, and caused by an obstruction to the free passage of the air in some part of the respiratory tract. External causes are nasal polypi, thickening of the membrane, the pharyngeal polypi, deformed bones, paralysis of the wing of the nostril, and, more than anything else, paralysis of the muscles of the larynx.

Grunting—A horse is usually first tested by veterinarians for grunting, when, if the fault is discovered, he will be further tested for roaring. Grunting is a sound emitted during exhalation, when the animal is suddenly moved or struck at.

High Blowing is distinctly a nasal sound, but it must not be confounded with roaring, it is a habit and does not constitute unsoundness. In the same class should be placed whistling and thick wind.

Bronchitis, or Inflammation of the Bronchial Tubes—While the causes of this disease are of the same order as for other diseases of the respiratory organs, some special causes are the inhalation of irritating gas or smoke, and fluids or solids gaining access to the parts. It is also occasionally associated with influenza, or fever, and frequently supervenes a common cold or sore throat. The animal appears dull, the appetite is partially or wholly lost, the head hangs, and the cough, at first light, is succeeded by a high rasping cough. He prefers to stand with his head to a door or window to secure fresh air and persists in standing. He has more or less thirst,

and frequently the mouth will be found full of saliva. The first step in the treatment of the disease is to secure a pure atmosphere and comfortable quarters whenever possible. A well-ventilated box stall will be found the best. The body should be covered with a blanket according to the season of the year, the legs should be hand-rubbed until they are warm, then flannel bandages applied to the knees and hocks. If the legs cannot be made warm after hand-rubbing, take any liniment used for sore throat and thoroughly rub in, after which the legs should be covered with bandages. It will be well to rub the same liniment over the chest, the elbow, and shoulder blade, and from the elbow below to within about 6 inches of the ridge of the backbone above. *Pleuropneumonia (qv)* may attack both lungs, but, as a rule, one lung only is affected.

Diseases of the Eye—It is impossible to overestimate the value of sound eyes in a horse, for not only does disease or injury depreciate the selling price of the animal, but it is a great source of danger at all times. Some diseases, like recurring inflammation or moon blindness, as it is called, are congenital. The structure of the eye is that of a spheroidal body, flattened behind. The posterior four-fifths is inclosed by an opaque, strong, fibrous membrane, which has on its inner side a more delicate membrane consisting principally of blood vessels and pigment cells, which in its turn is lined by the extremely delicate and sensitive expansion of the retina. The anterior fifth of the globe of the eye bulges forward from what would have been the direct line of the sclerotic, forming a segment of a much smaller sphere than is inclosed by the sclerotic. There are four straight muscles of the eye, and two oblique and one retractor, enabling the eye to turn inward, outward, upward, and downward, and when all act together the eyeball is drawn deeply into its socket. One of the most common diseases is inflammation of the eyelids, which is caused usually by exposure, bites, or stings of insects, pricks with thorns, or by a whip or club, or as a result of infecting inoculations. All the known causes may ordinarily be divided under the following heads: (a) inflammations due to constitutional causes, (b) those due to direct injury, mechanical or chemical, and (c) those due to inoculation with infecting material. The local treatments ordinarily advised consist of astringent, soothing lotions (sugar of lead, 30 grains, laudanum, two teaspoonfuls, rain water, boiled and cooled, one pint), applied with a soft cloth kept wet with the lotion and hung over the eye by tying it to the headstall of the bridle on the two sides. The horse should be fed from a high manger, so as to help the return of the blood from the head, and his diet should be laxative and nonstimulating. For a sty or boil of the eyelid, the practice is to apply a poultice of camomile flowers, with the addition of a few drops of carbolic acid. The poultice should be applied in a very thin muslin bag. Wounds such as torn eyelids, caused by the horns of cattle, or perhaps by teeth, or by nails, or the barbs of wire fences, are also frequent. In such cases the edges should be brought together as promptly as possible, so as to secure union without any unsightly distortions. It is an operation that requires experience and skill.

Lameness—By this is meant any irregularities or derangements of the functions of locomotion. There are innumerable forms of lameness,

the sources of many of which are so obscure as to defy location until the resulting disease has gained sufficient headway to be serious. In veterinary nomenclature each two of the legs, as referred to in pairs, are denominated a biped, the two forelegs being the anterior biped, and the two hunder the posterior, the two on one side are designated the lateral, and either the front or the hind biped with the opposite leg of the hind or the front biped, forms the diagonal biped. In health each biped as well as each individual leg has to perform an equal and uniform duty and carry an equal share of the total weight of the body, so that the result ought to be a regular, evenly balanced, and smooth displacement of the body. According to the rapidity of the motion of the animal in different gaits, each single leg is required at certain moments to bear the weight which had the moment before rested on its congener, or again the legs of one biped may be required to carry the weight of its opposite biped. Beginning with diseases of the bones as a common source of lameness, the "splint" (qv) will be found to be of the commonest occurrence. Indeed, a horse which does not possess one or more belongs to a very small minority. The splint is a bony enlargement on the cannon bone, between the knee or hock and the fetlock joint. *Ringbones* (qv) usually result from heavy labor before the animal was of sufficient age, and consequently before the bones were sufficiently ossified, or else from bruises, sprains, or other forms of violence. *Sparin* (qv), or exostosis of the hock joint, is a disease of the most serious kind for many reasons, not the least of which is the slowness of its development and the insidiousness of its growth. *Fractures* are of less serious consequence in the horse than in man, but nevertheless they are always a matter of grave import and demand at once a most skillful treatment. *Windgalls* (qv) is a name given to the dilated bursa found at the posterior part of the fetlock joint. *Sprains* are diseases of the muscles and tendons. Ordinarily the cause of a sprain may be attributed to a fall or overstrain, and subsequent soreness, swelling, and suspension of functions. Rest is the prime essential, the treatment consisting of local applications, stimulating liniments, counterirritation, and occasionally firing. Lameness of the shoulder from spain is the most frequent and is popularly described as slip of the shoulder. With draft horses it frequently is caused by the effort necessary to move off a heavily loaded vehicle. In the great majority of cases a rest is all that is necessary to effect a cure. Under the general classification of diseases of the fetlock, ankle, and foot are to be found many of the most common as well as most fatal (so far as the value of the animal is concerned) diseases known to veterinary science. Many horses are predisposed to injuries and diseases because of imperfectly formed feet, in consequence of which they are peculiarly liable to diseases of this character. Flat-footed horses are liable to corns, pumiced sole, bruises of the sole, and kindred troubles, owing to the fact that the soles of their feet have little, if any, convexity. The flat foot has no arch, so that the weight of the animal falls on the entire plantar surface instead of on the wall, which allows of little, if any, elasticity in the sole. In *clubfoot* the feet have the wall set nearly perpendicular, and consequently the heels stand high and the fetlock joint is either thrown for-

ward or knuckled, and the weight of the animal is thrown onto the toes. In *crooked foot* one side of the wall is higher than the other, causing the animal to be pigeon-toed as well as making it "interfere." *Interfering* is when one foot in action strikes the opposite leg. *Knuckling* is another fault, which causes stumbling, and while not always an unsoundness in itself, yet frequently leads to fracture of the pastern. It is a partial dislocation of the fetlock joint and is caused more often by heavy work in hilly districts or fast work on race tracks or hard roads than anything else. The principal remedy for all faults of conformation will be found in suitable horseshoeing, which subject is discussed at some length under *HORSESHOEING*. *Sprains of the fetlock* are the consequence of knuckling or any diseases which interfere with proper locomotion, such as *navicular disease*, *chronic laminitis*, *contracted heels*, *side bones*, or such external causes as a rut or hole in the road, or any accident which causes the animal to fall. For slight injuries cold-water bandages and a few days' rest will be found sufficient. Should there be severe lameness or much swelling, a stream of cold water playing upon the leg will be found very beneficial. On the subsidence of the inflammation a blister should be applied to the joint. When the shoe of the hind foot strikes the heel or quarter of the forefoot, the animal is said to *orencach*, a trouble common to trotting and running horses. When the hind foot catches well back on the heel of the forefoot, the horse will frequently be thrown on his knees or the shoe torn from the forefoot—an accident known colloquially as *grabbing*. The art of the shoeing smith is demanded if future injuries are to be avoided. Wounds should be dressed with tincture of aloes, oakum, and a roller bandage and in any case the animal should never be driven at a very fast gait unless his heels and quarters are protected with quarter boots. Heavy or draft horses are liable to calk wounds, caused from tramping either on themselves or each other. Good shoeing and the use of boots will be found the best remedy. *Quittors* (see *QUITTOR*) are authoritatively divided into four classes: (a) Cutaneous quittor, (b) tendinous quittor, (c) sub-horn quittor, and (d) cartilaginous quittor. *Thrush* (qv) is more common with draft horses than any other breed and is usually caused by a filthy, ill-kept stable. *Corns* are injuries to the living horn of the foot, appearing in that part of the sole which is included in the angle between the bar and the outside wall of the hoof. They are described, according to the character of the conditions which follow the primary injury, as the dry, the moist, and the suppurative. The disease is confined almost exclusively to the forefeet, because of the greater weight which they support, and because the heel of the forefoot in action first strikes the ground and thus receives much more shock or concussion than the heel of the hind foot, in which the toe first makes contact with the ground. Faulty shoeing is the great predisposing cause, or else the presence of small stones or other objects between the sole and shoe. Lameness caused by bruises of the frog is best treated by putting the foot at once in a bath of cold water in order to prevent supuration, and this will frequently be effective if the disease is caught at the beginning. If supuration, however, has already commenced, the horn of the frog and of the bars and branches of the sole, if necessary, is to be pared thin in

order that the foot may be poulticed and all pressure removed. When the lameness has subsided and the exposed part is covered by a new layer of horn, the foot may be shod. Punctured wounds of the foot are of everyday occurrence, and when they, as frequently happens, involve the more important organs contained in the hoof no disease or wound can be more serious. Most frequently a "picked-up" nail is the cause of trouble and again the wounds may happen from sharp pieces of rock, glass, wire, etc. The nearer the injury is to the centre of the foot, the more possibilities there are of disastrous results. Punctured wounds of the anterior parts of the sole are the more dangerous because of the possibility of injury to the coffin bone, the most serious wounds being those which puncture the centre of the foot. Sometimes it happens that a nail has penetrated the frog and remained there for several days without causing lameness, the first evidence of an injury betraying itself when the foot is being cleaned. It must be remembered that, if the injury is not too deep, suppuration will be established before lameness develops, so that the feet should always be most closely scrutinized. Should the coffin joint have been penetrated either by the external cause or by the process of suppuration, an acute inflammation of the joint will follow, which will be invariably accompanied by high fever as well as loss of appetite. In all cases of punctured wounds the horn near the seat of injury should be thinned down, a free opening created for the escape of suppurated matter, and the foot itself placed in a poultice. Where the injury is not serious, recovery in a few days' time is ordinarily assured, but where serious injuries have been inflicted, the foot should be treated to a cold bath or the stream of cold water described in the treatment for quittor (q.v.). *Contracted heels*, or, as it is more frequently called, hoofbound, is common among saddle horses and those kept on hard floors in dry stables. Ordinarily but one foot is affected at a time, and one of the forefeet principally. The disease itself is an atrophy or shrinking of the tissues of the foot, which diminishes in particular the diameter of the heels. Another very prevalent cause is faulty shoeing, although it sometimes happens that it results from other diseases of the foot, as, e.g., thrush, side bones, coins, etc. The disease is indicated by a pinched and shrunken frog, high heels, long bars, straight walls, and hoof so dry that it is almost impossible to cut it. The treatment consists first of all of preventive measures. The feet are kept moist and the horn is prevented from drying out by the use of moist sawdust, occasional poultices of boiled turnips, and a free use of greasy hoof ointments on the sole and walls of the feet. Careful shoeing, however, will be found to be one-half of the cure. *Sand cracks* may happen on any part of the wall, although usually they appear directly in front and are called *toe cracks*, or on the lateral parts of the walls and are known as *quarter cracks* (q.v.). The latter usually affect the forefeet, and the former the hind feet. A sand crack, which is a solution of continuity or fissure in the horn of the wall of the foot, may be superficial, involving only the outer parts of the wall, or it may be deep, involving the whole thickness of the wall as well as the soft tissues beneath. The disease is most serious when it involves the coronary band and may be further complicated by hemorrhage, inflammation of the laminae, suppura-

tion, and gangrene. The predisposing cause of sand cracks is the relative dryness of the horn, although excessive dryness is not more dangerous than alternate changes from damp to dry. Other predisposing causes are heavy shoes, large nails, and bad shoeing in general, together with such diseases as canker, quittor and suppurative coins. Very little can be done in the way of prevention, but the suppleness of the horn may be maintained by the use of ointments, damp floor, bedding, etc., as well as by proper shoeing. After the fissure has made its appearance, all efforts should be directed to prevent its growing longer and deeper, the usual method being to arrest all motion in the edges. A very simple appliance for holding the borders of a toe crack together is the *vachette clasp*. This is made of stiff wire and is strong enough to prevent all motion in the borders of the crack. Where these instruments cannot be obtained, a good substitute is to drill a hole through the horn across the fissure and close the crack by means of a thin nail made of tough iron and neatly clinched at each end.

Care of the Horse Careless and improper feeding and watering are responsible for most of the digestive disorders with which the horse may be troubled. With the horse digestion takes place principally in the intestines, and in selecting food for a horse the anatomical arrangement of its digestive organs and the physiological functions they perform should be carefully studied. All food should be wholesome and clean, the animal should be fed regularly and, because of his small stomach, in small quantities and frequently. A horse should never be fed too soon after a hard day's work. He may be given a small quantity of hay, but one or two hours should elapse before he gets his regular meal. When it is contemplated to change the food, care should be taken to make the change very gradually, and in any case the quantity of food given must be in a direct proportion to the amount of labor performed. Should the horse stand several days in the stable, his food should be of a more laxative nature. The following foods are considered the best: the best hay for horses is "timothy," preferably that about one year old, of a greenish color, and possessing a sweet aroma. A horse fed on grain should be allowed from 10 to 12 pounds of good hay a day. Wheat and rye chaff should never be used. Of the grain foods, oats easily take the precedence. The best oats are one year old, plump, short, hard, bright, and sweet. They are given either whole or crushed. A fair allowance for the average horse is about 12 quarts of good oats a day. Wheat and rye should not be used except in small quantities and mixed with other grains or hay. The bran of wheat is the one most used, although its value is variously estimated. It is always fed with other grains and tends to keep the bowels open. Corn on the cob is generally used as food for horses affected with "lampas." It is better given ground and fed in quantities of from one to two quarts at a meal, mixed with crushed oats or bran. Linseed is occasionally fed with other foods to improve the condition of the skin and keep the bowels open. It is of particular service during convalescence. Steamed or boiled roots and potatoes are frequently used as an article of food, but carrots make the best diet, particularly during sickness. Grass is the natural food of the horse, but it is not sufficient to keep it in condition for work. The amount of water re-

quired by the horse varies according to the character of his food, but, roundly stated, about eight quarts a day will be a fair average. When resting, water should be given three times a day, when at work, more frequently. The very prevalent impression that when a horse is warm he should not be allowed to drink is very erroneous. No matter how warm a horse may be, it is always safe to allow him from 6 to 10 swallows of water. The danger is not in the water, but in the excessive quantity that the animal will take when warm, if not restrained. It should not be given when ice cold. The total number of horses in the United States continues to increase despite the fact that much of the service formerly rendered by horses is now performed by the automobile. The number on farms in 1914 was estimated by the Department of Agriculture at 20,962,000 against 16,736,059 in 1904, the value, in 1914, \$2,291,638,000 against \$1,136,940,000 in 1904. The number in cities was, in 1910, 3,182,789 against 2,936,781 in 1900.

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Gay, *Productive Horse Husbandry* (Philadelphia, 1914). See CURB, ROARING.

HORSE A miner's term, applied to any intruded material which is the apparent cause of a sudden interruption in the continuity of a mineral that is being quarried, as when a dike of igneous rock cuts across an ore body. In vein mining a detached mass of rock which fills the vein is called a horse, while colliers apply the term to the shale which replaces the coal bed, as well as to such interruptions as seem to have been the channels of small streams, and which were subsequently filled up by the clay that formed the roof of the coal.

HORSE On shipboard, an iron jackstay or rail used as a guide for a traveler or as a securing bar, usually called a *horse rail*. Also the old name for a footrope on a yard. The secondary footrope at the end of a yard is still called the *Flemish horse*.

HORSE, FOSSIL Remains of horses, often of extinct species, have been found in the cave beds, river gravels, bone licks, and loess deposits of the Quaternary period, or Age of Man, in almost all parts of the world. In the more ancient deposits of the Tertiary period, or Age of Mammals, have been found remains of a series of ancestors of the horse which illustrate the evolution of this race through this entire geological period, a time probably of some millions of years. Fossil horses of the Age of Man are much like the existing species and are included for the most part in the same genus (*Equus*). They have been found in Europe, Asia, Africa, North and South America, but none in Australia or in the Oceanic islands, except in those which, like the British Isles, were joined to the continental mainland during the early part of the Quaternary period. With these exceptions the animal was of world-wide distribution and inhabited especially the open grassy plains and high plateaus of the interior of the great continents, at the beginning of the Age of Man. All these races were at first wild.

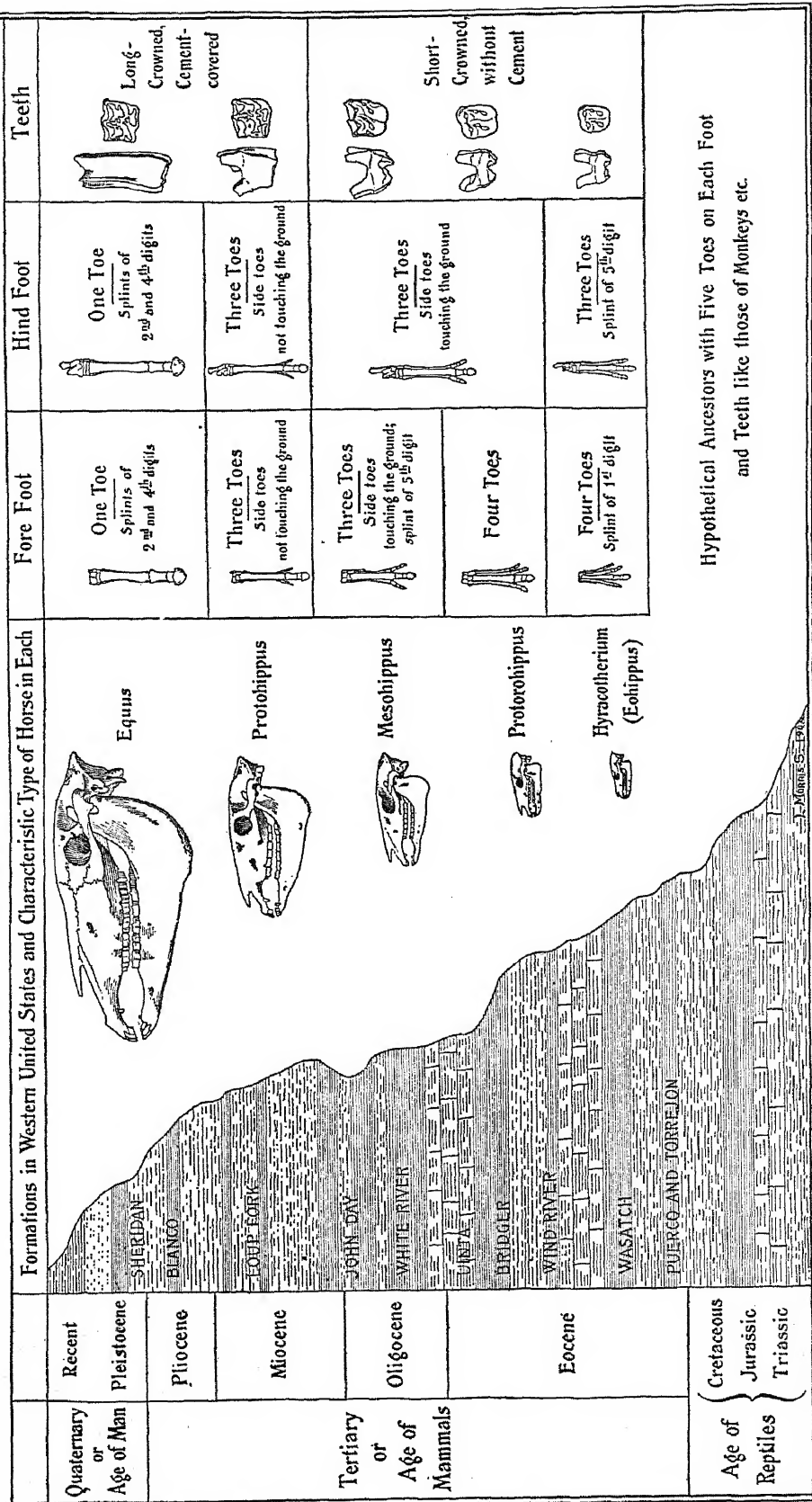
In the New World they apparently became extinct, for when the Spaniards invaded America, they found no horses, wild or domesticated. The Indians, who had domesticated the llama, the alpaca, and the dog, knew nothing of the horse and were astonished and terrified at the sight of the strange and unfamiliar animals which the newcomers rode. Yet, when introduced by the white races, the horse ran wild and flourished and increased greatly in the same regions where its native cousins had formerly lived, showing how well the country was suited to its needs.

In Central Asia two wild races, Przewalsky's horse and the Asiatic wild ass, or kiang (q v), persist to the present day; others were domesticated by man in the earliest times, and their use in Chaldea and Egypt for draft and riding is depicted in the ancient mural paintings. In Africa the larger species became extinct, but the smaller zebras still survive in the southern part of the continent and the African wild ass in the northern part (Somaliland).

The wild species of Europe, a small race, short-legged and shaggy-haired, was domesticated by man, for it is represented in rude prehistoric drawings scratched on bone or ivory by men of the Neolithic or Polished-Stone age.

The domesticated horses now in use are chiefly derived from the Asiatic race, but it is probable that in some breeds there is a considerable

THE EVOLUTION OF THE HORSE.



strain of this European species or variety, and it is possible also that African races may have been domesticated and to some extent mixed with the Asiatic species. The existing wild horses of North and South America, the bionchos and mustangs, are descendants of the animals brought over by the Spaniards, but it is possible that in South America some survivors of the native races still existed at the time of the discovery of the continent, and mixed with the introduced species when it ran wild.

In general, only fragmentary specimens, parts of skulls, bones, or teeth of these extinct horses have been found fossil, so that their characters are very imperfectly known. A number of complete skeletons were found in Texas in 1899, one of which was placed in the American Museum of Natural History, New York. This species, *Equus scotti*, was of the size of a trotting horse, but in proportions more like a zebra, with deep jaw, short neck and legs, and small feet. Another extinct species, the *Hippidium* of Argentina and Patagonia, was large-headed, with extremely short and stumpy legs and feet, exaggerating some of the peculiarities of the Shetland pony, although of larger size.

Tertiary Ancestors of the Horse The history of the evolution of the horse through the Tertiary period affords the best-known illustration of the doctrine of evolution by means of natural selection (qv) and the adaptation of a race of animals to their environment. The ancestry of this family has been traced nearly as far back as the beginning of the Tertiary without a single important break. During this long period of time, estimated at nearly 3,000,000 years, these animals passed through important changes in all parts of the body, but especially in the teeth and in the feet, by which they became adapted more and more perfectly to that particular environment, viz., the open plains of a great plateau region with their scanty stunted herbage, which are the natural habitat of the modern horse.

Equine Characteristics The horse (including under his name the asses and zebras, as well as the true horses—see EQUIDÆ) is unique among modern animals in the fact that it walks on the extreme tip of the central digit of the foot, corresponding to the middle finger nail of man, and that all the remaining toes have completely disappeared. The feet are greatly elongated, so as to equal the other segments of the limbs in length, and to raise the animal much higher above the ground than if he walked, as does a man or a bear, on the sole of the foot. In each foot the first and fifth digits (thumb and little finger) have completely disappeared and left no trace, while of the second and fourth digits only a small slender rudiment exists which represents the metapodial, or bone of the palm, and is called a splint. These two splint bones lie closely against the cannon bone, or metapodial of the central digit, and are not indicated on the surface of the foot. The modern horse is therefore one-toed.

The teeth are equally peculiar. There are six grinding teeth in a closely set row on each side of each jaw, the crowns of these are very much elongated, so that they can be pushed up in their sockets as fast as they wear away at the grinding surface. The grinding surface displays a complicated pattern caused by infoldings of the enamel of the tooth, the enamel edges being supported on one side by the dentine of the

tooth, on the other by a similar substance called cement, deposited on the outer surface of the unworn enamel before the teeth are extruded from the gums. This arrangement secures at all stages of wear a series of hard enamel ridges projecting a little above the surface of the softer dentine and cement, and makes a remarkably efficient grinder for the hard, dry grasses which are the natural food of the horse (qv). In the series of animals which lead up to the modern horse we can trace every step in the evolution of these marked peculiarities of teeth and feet, from an ancestor so little suggesting the horse that when first found it was named by Richard Owen, the greatest comparative anatomist of his time, *Hyracotherium* (coney-like beast). Its relation to the horse was not at all suspected and was recognized by Huxley and Marsh only when the series of intermediate stages between *Hyracotherium* and the modern horse was discovered. This first ancestor of the horse line is very much more like the contemporary ancestors of other lines of descent and indicates how all the modern quadrupeds have diverged from a single type, each becoming adapted to its especial mode of life.

Stages in the Evolution Series The *Hyracotherium* (renamed *Eohippus*) of the Lower Eocene was a small animal, no larger than the domestic cat, with four complete toes on each forefoot and three on each hind foot. There is reason to believe that the still more ancient ancestors of this and all other mammals had five toes on each foot, and in the *Hyracotherium* forefoot we find a splint bone representing the missing first digit, or thumb, while in its hind foot there is a splint bone representing the missing outer (fifth) digit, but here no trace is left of the innermost (first) digit. The proportions of the skull, the short neck and arched back, and the limbs of moderate length were very little horselike, recalling some modern carnivorous animals, especially the civets. The teeth, short-crowned, covered with low rounded knobs of enamel, suggested those of monkeys and of pigs, but not at all the long-crowned complicated grinders of the horse. Beginning with this small and primitive animal, 11 stages have been recognized from as many successive formations, showing the gradual evolution of the race into its modern form. Each stage is characteristic of its particular geological horizon. Some have been found in several parts of the world, but by far the most complete and best-known series comes from the Tertiary Bad Lands of the Western States. Besides the main line of descent, which has led into the modern horses, asses, and zebras, there were also collateral branches, which have left no descendants. Only the more important stages can be mentioned here.

The successors to the *Hyracotherium* were the *Protorohippus* and *Orohippus* of the Middle Eocene. A complete skeleton of the former animal, from the Wind River valley, Wyoming, is in the American Museum of Natural History in New York City. It is about the size of the kit fox, and much like its predecessor, the *Hyracotherium*, except that the splint representing the fifth digit in the hind foot has disappeared.

In the Upper Eocene the *Epihippus* occurs, but only fragmentary specimens have been found. These show that the middle toe was

becoming more prominent, and the side toes, especially the outer toe of the forefoot, were quite slender. Contemporary with this animal was the very much larger *Palæotherium* of Europe, related to the horses, but not in the direct line of descent.

In the Oligocene is found *Meshippus*, of which several complete skeletons are known. The various species range in size from that of a red fox to a mastiff. There are but three toes in each foot, the outer digit of the forefoot being now reduced to a splint bone and no longer appearing as a separate toe. The central toe in both fore and hind feet is much larger, and the side toes, although they still reach the ground, are quite slender and can support but a small part of the weight of the animal.

The teeth are of the crested or lophodont type, the crests higher and sharper than in the preceding genera. This constitutes the necessary intermediate stage in the conversion of the low, round-knobbed, or bunodont crown into the high, sharply crested crown with cement bracing which characterizes the later horses. See TOOTH.

In the Miocene is found *Protohippus*, in which the side toes, although still complete, are extremely small and slender and do not reach the ground. They can therefore no longer assist in supporting the weight of the animal and are merely useless rudiments. Various species range from the size of a mastiff to that of a Shetland pony. The teeth in this animal are much more like those of the modern horse, the crown is greatly lengthened, the crests or ridges being higher and more complicated, and the valleys between the ridges are filled up with a material (cement) approximating the dentine in texture and hardness. A new and very effective method of grinding is thus begun, for when the sharp enamel crests wear down, they form a double ridge of enamel supported within by dentine and without by cement, the two latter are softer than the enamel and wear away more rapidly, leaving it as a sharp projecting ridge, continually renewed with the wear of the tooth. The tooth is pushed up from the jaw as fast as it wears off on the grinding surface, so that it becomes an efficient grinder for those hard, siliceous grasses which would rapidly wear down a tooth of the old pattern to a useless stump.

In the Pliocene lived the *Platichippus*, of which very little is known, except that it was either one-toed or had the side toes reduced to extremely small rudiments, and the teeth were much like those of *Protohippus*, which it a little exceeded in size.

In the Pleistocene is found the modern genus *Equus*, of larger size, with but one toe on each foot, the lateral digits represented by splint bones, and with teeth longer-crowned than those of *Protohippus*, enabling the animal to grind hard grasses still more efficiently. Extinct species have been found in Europe, Asia, Africa, North and South America, as we have seen above.

Meaning of the Changes in Feet and Teeth. Along with the disappearance of the side toes in the evolution of the horse there is a considerable increase in the proportionate length of the limbs and especially of the lower part of the leg and foot. The surfaces of the joints, at first more or less of the ball-and-socket kind, permitting of free motion of the limb in all directions, become keeled and grooved

like a pulley, thus permitting free motion forward and backward, but limiting the motion in all other directions and increasing considerably the strength of the joint. By this means the foot is made more efficient for locomotion over a smooth, regular surface, but less so over very rough ground, of little use for striking or grasping, or the varied purposes for which the feet of many-toed animals are used.

The increased length in the lower leg and foot increases the length of the stride without decreasing its quickness, for the heavy muscles of the leg are chiefly in the upper part, and to increase the length of the lower part changes the centre of gravity of the limb very little, and it consequently swings to and fro from the socket nearly as fast, for in an ordinary step the leg swings like a pendulum, and the speed of the swing is regulated by the distance of the centre of gravity from the attachment, as that of a pendulum is by the height of the bob.

To increase the length of lower leg and foot will therefore give the animal greater speed, but it puts an increased strain on the ankle and toe joints, and these must be strengthened correspondingly, by converting them from ball-and-socket joints to ginglymoid or pulley joints. Additional strength, likewise at the expense of flexibility, is obtained also by the consolidation of the two bones of the forearm (ulna and radius) and leg (tibia and fibula) into one, the shaft of the lesser bone practically disappearing while its ends become fused solidly to its larger neighbor.

Corresponding with the increase in length of limb, it is necessary for a grazing animal that the head and neck should increase in length in order to enable the mouth to reach the ground. So in the modern horse we find the neck and head much elongated when compared with the little *Hyracotherium*, and this elongation has taken place at equal pace with the elongation of the legs. The reduction and disappearance of the side toes, and the concentration of the step on the single central toe, serve likewise to increase the speed over smooth ground. The soft yielding surface of the polydactyl foot is able to accommodate itself to a rough, irregular surface, but on smooth ground the yielding step entails a certain loss of speed. An illustration is afforded by the pneumatic tire of a bicycle, a soft tire accommodates itself to a rough road and makes easier riding, but a hard tire is faster, especially on a smooth road. Similarly the hard, firm step from the single toe allows of more speed over a smooth surface, although compelling the animal to pick its way slowly and with care on rough, irregular ground.

The change in the character of the teeth from brachydont, or short-crowned, to hypsodont, or long-crowned, enables the animal to subsist on the hard innutritious grasses of the dry plains, which require much more thorough mastication before they can be of any use as food than do the softer green foods of the swamps and forests.

All these changes in the evolution of the horse are adaptations to a life in a region of level, smooth, and open grassy plains, which are the natural habitat of the horse. The race, better fitted at first for a forest life, has become more and more completely adapted to live and compete with its enemies or rivals under the conditions which prevail in the high, dry plains of the interior of the great continents. The great increase in size, which has occurred in

almost all races of animals whose evolution we can trace, is dependent on abundance of food. A larger animal, as may be shown on ordinary principles of mechanics, requires more food in proportion to its size than does a smaller one, in order to keep up a proper amount of activity. On the other hand, a larger animal is better able to defend itself against its enemies and rivals. Consequently, as long as food is abundant, the larger animals will have the advantage over their smaller brethren and by the laws of natural selection the race will tend to become continually larger until a limit is reached when sufficient food becomes difficult to obtain and the animal is compelled to devote nearly all its time to getting enough to eat.

Cause of the Evolution. The evolution of the horse, adapting it to live on the dry plains, probably went hand in hand with the evolution of the plains themselves. At the commencement of the Age of Mammals the western part of the North American continent was by no means so high above sea level as now, great parts of it had but recently emerged, and the Gulf of Mexico still stretched far up the valley of the Mississippi. The climate at that time was probably very moist, warm, and tropical, as is shown by the tropical forest trees found fossil even as far north as Greenland. Such a climate, with the low elevation of the land, would favor the growth of dense forests all over the country, and to such conditions of life the animals of the beginning of the Mammalian period must have been adapted. During the Tertiary the continent was steadily rising above the ocean level, and at the same time other influences were at work to make the climate continually colder and drier. These conditions restricted and thinned the forests and caused the appearance and extension of open grassy plains. The ancient forest inhabitants must then either retreat and disappear with the forests or adapt themselves to the new conditions of life. The ancestors of the horse, adopting the latter course, changed with the changing conditions, and the race became finally—as we see it to-day—one of the most highly specialized of animals in its adaptation to its peculiar environment. At the end of the Age of Mammals the continents stood at a higher elevation than at present, and there was a broad land connection between Asia and North America as well as those now existing. At this time the horses became cosmopolitan and inhabited the plains of all the great continents, excepting Australia.

It is a question whether the direct ancestry of the modern horse is to be searched for in western America or in the little-known interior plains of eastern Asia. It is also unknown why the various species which inhabited North and South America and Europe during the early part of the Age of Man should have become extinct, while those of Asia (horse and wild ass) and of Africa (wild ass and zebra) survive. Man since his appearance has played an important part in the extermination of the larger animals, but there is nothing to show how far he was responsible for the disappearance of the native American species of horse.

Parallel Evolution in Other Races. It is interesting to observe that while the evolution of the horse was progressing during the Tertiary period in North America another group of hoofed animals, now extinct, the Litopterna, in South America evolved a race adapted to the

broad plains of Argentina and Patagonia, and singularly like the horse in many ways. These animals likewise lost the lateral toes one after another and concentrated the step on the central toe, they also changed the form of the joint surfaces from ball-and-socket to pulley joints, they also lengthened the limbs and the neck and they also lengthened the teeth and complicated their pattern, but, unlike the true horses, they could not form cement on the tooth, and it was by no means so efficient a grinder. This group of animals, native to South America, became totally extinct and were succeeded by the horses which immigrated from North America, which in their turn became extinct before the appearance of civilized man. Many of the contemporaries of the horse in the Northern Hemisphere, such as the camels in America, the deer, antelopes, sheep, and cattle in the Old World were likewise lengthening the limbs, lightening and strengthening the feet, and elongating the tooth crowns, to adapt themselves to the changing conditions around them, but none paralleled the horse's evolution quite so closely as did the pseudo-horses of South America.

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For technical articles on fossil horses, consult the bibliography in Woodward, *Vertebrate Paleontology* (Cambridge University Press, 1898), and in addition Gidley, in *Bulletin of the American Museum of Natural History* (New York, 1900, 1901).

HORSE ANT. A popular name for certain hymenopterous insects forming the family Mutillidae. They are also known as cow ants, cow-killer ants, and velvet ants. Although they resemble the true ants, they are more closely related to the social wasps, though their females are wingless and solitary in their habits. They are ferocious stingers and are clothed with hair. In their early stages some are parasitic in the nests of wild bees. The term "horse ant" is also applied in England to certain true ants of the genus *Camponotus*.

HORSE ARTILLERY. A special type of field artillery, having greater mobility than light artillery and designed especially to accompany cavalry at any gait. The organization of the United States army requires the assignment of one horse-artillery regiment (24 guns) to each cavalry division. In the great European armies the proportion of guns to sabres is usually larger. Most armies use the same calibre and weight of gun and projectile for both light and horse artillery in order to avoid the difficulty of ammunition supply if different calibres were used. Increased mobility is obtained by reducing the weight behind the six-horse team in one or more of the following ways: by individually mounting all the cannoners on horses instead of on the carriages, by using special light limbers, by reducing the

number of rounds carried in the limbers. Great Britain is an exception to the general custom. Her horse artillery is equipped with a light 13-pounder, the light artillery with an 18-pounder. In the former case the weight behind the team is 3200 pounds, in the latter 4300 pounds. The United States three-inch light-artillery equipment, which is also used for horse artillery, puts 4260 pounds behind the team. The weight of the projectile is 15 pounds. On account of its superior mobility, horse artillery may be used for promptly reinforcing any part of the line; for occupying advanced positions seized by the cavalry; with the cavalry on raids, during reconnaissance in force, in combat, and in the pursuit of a defeated army. See ARTILLERY; FIELD ARTILLERY; ARMY ORGANIZATION; TACTICS, MILITARY.

HORSE BALM. See BALM.

HORSE BOT. The botfly of the horse (*Gastrophilus equi*). See BOT.

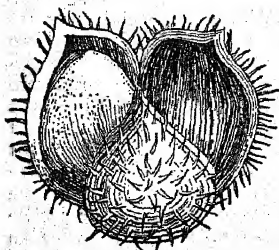
HORSE-CHESTNUT (so called probably from the large size of the nuts; less plausibly



A HORSE-CHESTNUT TWIG.

explained from the former use of them when ground as food for horses), *Æsculus*. A genus of trees of the family Sapindaceæ, in which the leaves are large, opposite, digitate; flowers with five spreading unequal petals, and the capsule leathery, three-valved, and covered with soft spines. The seeds, of which there are from one to three in each fruit, are large and somewhat resemble chestnuts; but the habit of the tree,

its leaves and flowers, are very unlike those of chestnuts, with which it has no botanical affinity. The common horse-chestnut (*Æsculus hippocastanum*) is a much esteemed ornamental tree, extensively used as a street tree in Europe and very fre-



HORSE-CHESTNUT FRUIT.

quently planted whenever the climate is suitable, on account of its rich foliage and its erect racemes of beautiful reddish-white flowers, which are produced on the extremities of the branches and contrast admirably with the dark

green of the leaves. It is supposed to be a native of Persia or some parts of the East and was introduced into western Europe from Constantinople at the end of the sixteenth century. It attains a great size, sometimes rising to the height of 100 feet and extending its branches very widely. Sometimes they droop almost to the ground. The leaves have long stalks and five to seven obovate wedge-shaped leaflets. The wood is soft, not very strong, nor very durable in the open air, but is used for many ordinary purposes and by carvers, turners, etc. The bark is bitter and astringent, contains a bitter principle called *æsculin*, and has been used in tanning and dyeing. The seeds are unpleasantly bitter and contain so much of the saponaceous substance peculiar to this family that when reduced to powder they may be used for washing. They contain, however, a large quantity of starch, which may be extracted and freed from bitterness by means of an alkaline solution or repeated washing. This starch is prepared on a large scale and at a cheap rate in France. Horse-chestnuts have long been employed in various countries as food for live stock, which are fond of them and grow fat upon them.

In the other species of *Æsculus* which are natives of North America the foliage is very similar to that of the common horse-chestnut. Both the leaves and fruit of the American buckeye (*Æsculus glabra*) are reputed to be poisonous. This tree ranges from Pennsylvania to Alabama and west to Kansas and Texas. North America possesses a number of other species with very similar foliage, smaller flowers, and smooth fruit. In California the seeds of *Æsculus californica* are used as food by some Indian tribes, as are those of *Æsculus turbinata* in Japan. The seeds of *Æsculus octandra*, the sweet or edible buckeye, are eaten, either boiled or roasted. This species is a shrub with long and beautiful racemes of fragrant white flowers which have long projecting stamens. It is a native of the Southern States. *Æsculus pavia*, a shrub or small tree found from Virginia southward, has bright red flowers. *Æsculus indica* is a lofty tree which grows at elevations of 8000 to 10,000 feet in the Himalayas and produces seeds very similar to those of the horse-chestnut, which, although bitter, are eaten in time of scarcity.

HORSE CREVALLÉ, kre-vál-lá'. See CREVALLÉ.

HORSE FAIR, THE. A well-known painting by Rosa Bonheur (q.v.), exhibited at the Salon of 1853. After passing through several hands it formed part of the Stewart collection and was finally purchased by Cornelius Vanderbilt and presented by him to the Metropolitan Museum, New York, where it now hangs. There are several replicas by the artist in England and an engraving of the painting by Thomas Landseer. The canvas shows a number of horses on the road to a fair—some with riders, some led, and some free.

HORSE/FISH', or HORSEHEAD. See MOON-FISH.

HORSE/FLY'. See GADFLY.

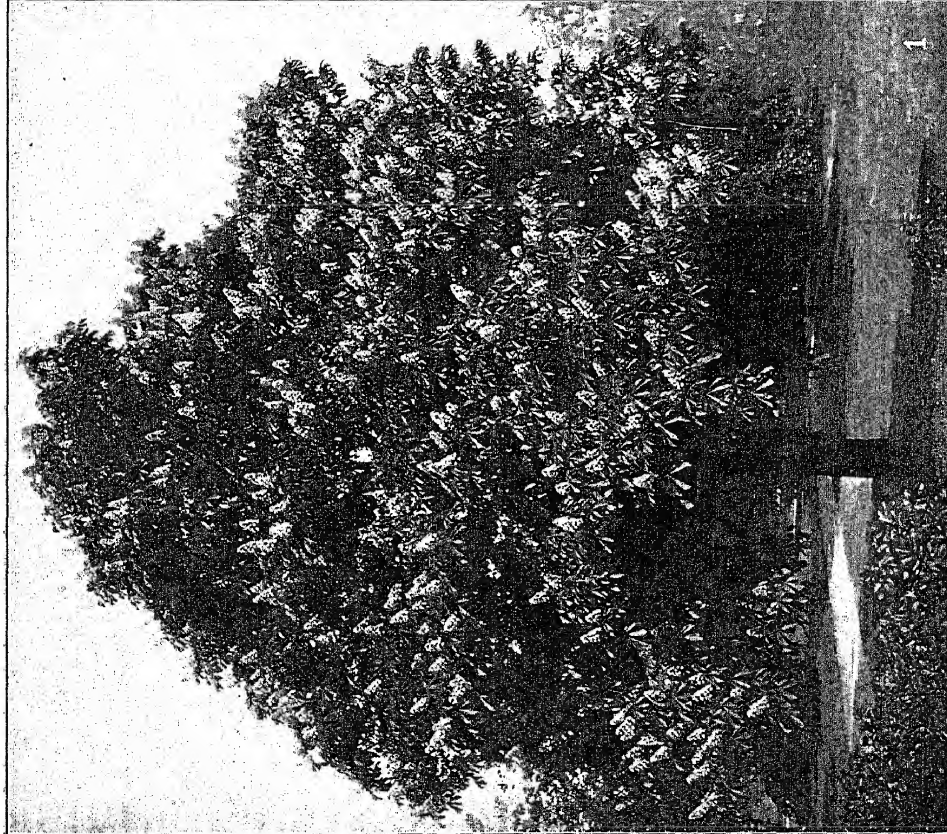
HORSE/FOOT' SNIPE. See TURNSTONE.

HORSE GENTIAN. A North American medicinal plant. See FEVERWORT.

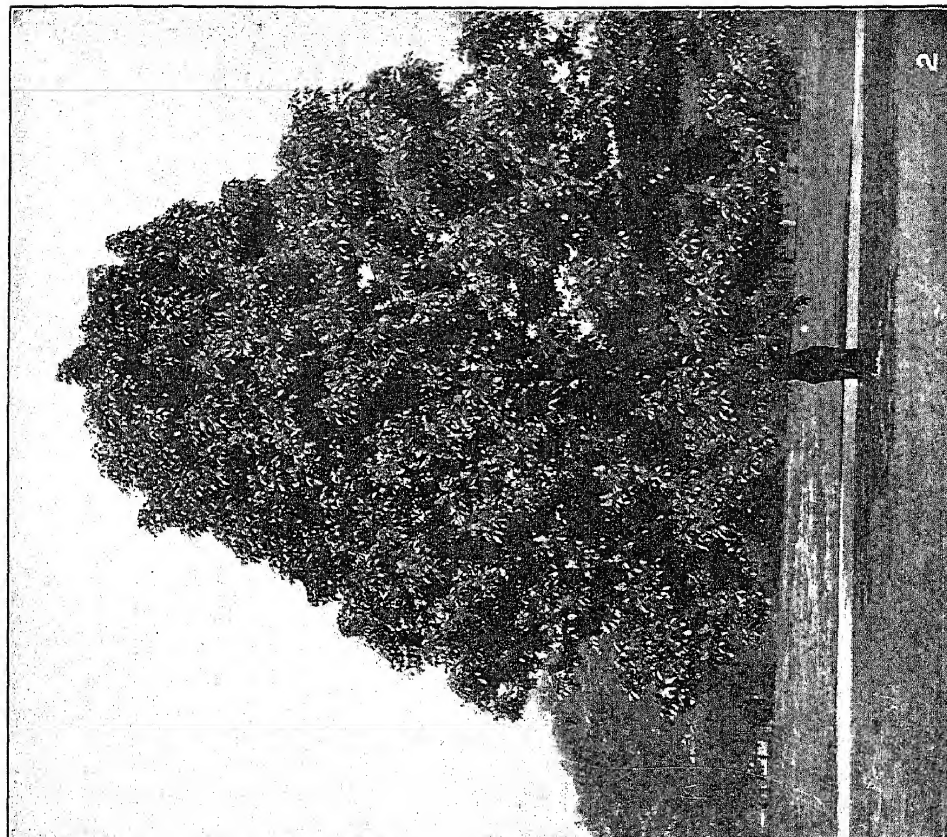
HORSE GRENADEIERS. See MOUNTED INFANTRY.

HORSE GUARDS. The military headquarters of the British army and the offices of the

HORSE CHESTNUT

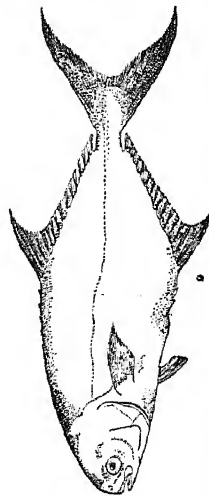
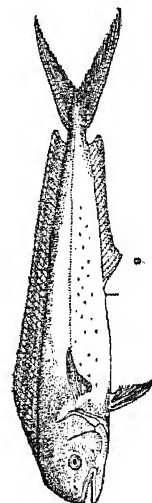
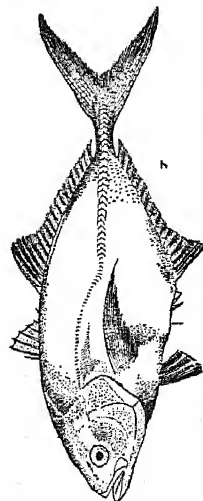
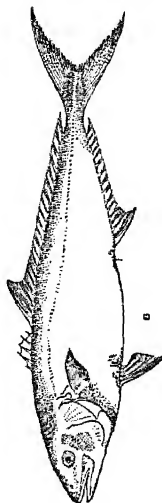
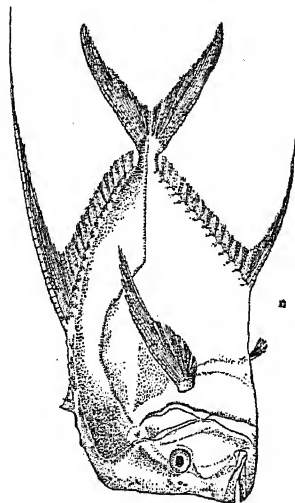
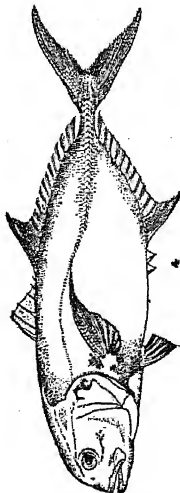
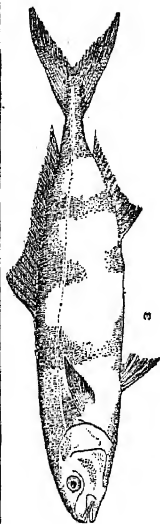
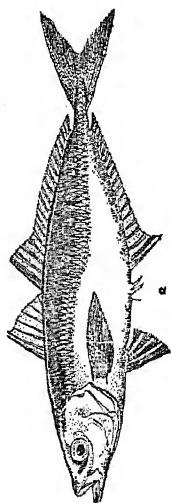
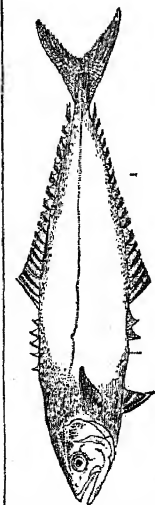


1. HORSE CHESTNUT TREE (*Æsculus Hippocastanum*) IN BLOOM



2. OHIO BUCKEYE (*Æsculus glabra*).

HORSE MACKEREL



1. LEATHER-JACKET (*Oligoplites saurus*).
2. SAUREL (*Trachurus trachurus*).
3. PILOT-FISH (*Naucrates ductor*).

4. CREVALLE (*Caranx hippos*).
5. MOONFISH (*Selene vomer*).
6. YELLOWTAIL (*Seriola dorsalis*).

7. JUREL (*Caranx latus*).
8. DOLPHIN (*Coryphaena hippurus*).
9. POMPANO (*Trachynotus carolinus*).

field marshal, commander in chief, War Office, Pall Mall, London, S W It is a term used to distinguish the purely military part of the army organization from that of the civil authority, the Secretary of State for War The oldest cavalry regiments of the British army are also known as the Horse Guards, the term including the Oxford Blues, first raised by the Earl of Oxford in 1660 and now styled the Royal Horse Guards, or The Blues, and the First and Second Regiments of Life Guards (qv), organized in 1661-62

HORSE LATITUDES See CALM LATITUDES

HORSELESS CARRIAGE. See AUTOMOBILE, MOTOR VEHICLE

HORSELEY POWDER See EXPLOSIVES.

HORSE MACKEREL. A name given to several species of fishes of the family Carangidae, and especially in Great Britain to the scad (*Caranx trachurus*) and in the United States to the crevalle (*Caranx hippos*) The carangids are all trim, vigorous fishes and are peculiar in that the teeth, when present, are villiform or conical Usually the scales are very small, or they may be altogether wanting In many instances the lateral line is entirely or partially armed with shieldlike, overlapping plates (See Fig 2, on the Plate of HORSE MACKEREL, accompanying this article) The horse mackerels are distributed over all seas except the polar, and their remains go back to Cretaceous time, while they are profusely represented in marine strata of Eocene date They sometimes gather in enormous shoals and are captured in vast quantities in seines They are carnivorous and swift and fierce in pursuit of lesser fishes Their flesh is excellent food The typical genera are slender, compressed, mackerel-like fishes, but the family includes many others of different form, such as the amber fishes (*Seriola*), the pilot fishes (*Naucrates*), the moonfishes (*Vomer* and *Selene*), and the pompanos These are described individually under their names elsewhere Consult A C L G Gunther, *Introduction to the Study of Fishes* (London, 1880), and G B Goode, *American Fishes* (new ed, Boston, 1903) See TUNNY, CREVALLE

HORSEMANSHIP The art of managing horses It is to the Greeks that we must look for our first knowledge of the history of horsemanship, for when primitive man first ventured upon the back of a captured horse is, at the best, a matter of conjecture. The bit could not have been known before the age of bronze, but undoubtedly the first horsemen employed a halter or thong of rawhide passed through the animal's mouth in order to direct and control it According to the evidence of the Egyptian monuments, bit, bridle, harness, and chariot were employed, and we know from other sources that the bridles of the early horsemen of Egypt and Asia were considerably decorated with tassels, crests, and embroidery, in a manner both rich and elaborate, but anything approaching the modern saddle was unknown to either Egyptian, Assyrian, or Persian Instead, a decorated and fringed cloth fastened to the animal by a girth was employed to afford the horseman a seat The warlike tribes occupying the northern border of Greece are credited with the introduction of horsemanship among the Greeks, among whom the art was held in very high esteem Horse races were a conspicuous feature of their festivals and games, a note-

worthy feature in connection with which was the fact that the tact and judgment of the rider were frequently more important factors in gaining the decision than the superiority of the horse The Athenians were especially devoted to the art, and the rules of horsemanship, so far as the seat is concerned, did not differ in essence from the good horsemanship of to-day That the Greeks excelled in the exercise is evident from the fact that they were in the habit of taking all sorts of "leaps" (according to Xenophon), "across ditches, over walls, upon and from banks," and in military evolutions particularly, demonstrated their mastery of the art of equitation The stirrup was not known to the Greeks, and probably its absence helped to make them the finished horsemen they undoubtedly were The Romans undoubtedly learned the art of horsemanship from the Greeks and, in fact, ascribed the inventions of bridle and chariot, as well as attributed the first conquest of the horse, to their teachers

Medieval Horsemanship Although there is no proof of the fact, it is nevertheless probable that the saddletree had been used for pack animals from a very early date, and that the riding saddle in some form or shape was known before the fifth century B C, the era of its reputed first appearance The difficulty of mounting into the saddle encumbered with heavy armor led through a series of contrivances to the introduction of the stirrup

Modern Horsemanship. The first treatise upon the subject was that published by Federico Grisoni, entitled *Gli ordini del cavalcare* (Naples, 1550) A contemporary of Grisoni was the celebrated teacher, Pignatelli, who is regarded by many as the author of the foundation of our present system of riding Two of his pupils, La Broue and Pluvinel, became famous throughout Europe Subsequent important writers and their works in England are Blundeville, *The Four Chiefest Offices Belonging to Horsemanship* (c 1570), translations from the Italian, by Gervase Markham (1593) and Sir William Hope (1696), Thomas de Gray, *Complete Horsemanship and Expert Farrier* (London, 1639) The Duke of Newcastle's *Méthode nouvelle de dresser les chevaux* (Antwerp, 1648) was first written in English and afterward translated into the language in which it was published It was for a long period regarded as the great standard authority on horsemanship, although to-day its teaching would be regarded as impossible

Speaking generally, there are at present two forms of riding, (1) with the stirrup straps shortened so that the legs are necessarily somewhat bent, and the rider is thereby enabled to rise in his saddle when his horse is at a trot, and (2) with the stirrups let down so that the rider's legs are straight and carry practically none of his weight, with the result that he literally sits in his saddle, whatever the gait of his horse. The first-named method is commonly employed by English riders The second form is always used by the American cowboys—among the most expert riders in the world—who doubtless had it from the plains Indians, and is the one adopted by the United States cavalry It is much less tiring to the horse as well as the rider than is the method which involves more or less constant and considerable use of the rider's leg muscles

There are several methods of mounting a

horse, each one with its own distinct advantages and disadvantages. Ordinarily the young horseman is taught to mount from either side, but usually from the "near," or left, side of the horse. The common English method is to place the snaffle rein round the third finger of the left hand, grasp a wisp of the horse's mane between the finger and thumb of the same hand, placing the left foot in the stirrup, and the right hand on the cantle, then with a spring to throw the right leg over the horse, and seat oneself in the saddle, meanwhile releasing the mane. The rider next secures the curb reins in the left hand, in such a manner that the left rein is outside the little finger, and the right between the first and second fingers. When the rein has been drawn in sufficiently for the rider to feel the horse's mouth gently, the loose part, or slack, is thrown over the first finger and held between that and the thumb. In America both reins are placed in position in the left hand before mounting. The whip in mounting is held in the fork of the thumb of the left hand and afterward taken into the right hand. The manner of holding the reins differs in different countries of Europe as well as in America, the more general method, other than that of the English already described, being its exact opposite in that the curb is held inside the snaffle. An interesting variant is the method used by the cowboys of the western United States. The single curb rein with which they ride is hung over the little finger of the left hand, the "romel" or permanent quirt attached to the rein, coming up through the fork of the thumb. The hand is laid lightly on the horse's mane as the rider stands by the horse, right foreleg facing the rear, he takes the stirrup in his right hand and reverses it, inserts his left toe, and catching the projecting horn of the saddle with his right hand, swings lightly to his seat, the horse being trained to start the instant he feels the rider's weight on the stirrup. This form of mounting has been developed through the necessity of getting on half-broken and often plunging horses.

Upon mounting, the rider should firmly seat himself in the middle of the saddle, which ought to be placed well behind the rise of the shoulders, his legs, which should work in sympathy with his hands, just about covering the girth, so that when using leg pressure to the horse, it may be easily and effectively applied immediately behind the girth. The elbows should hang loosely and naturally from the shoulder, permitting a free use of the hands, which latter should always be in a position to "give and take" without compromising control over the horse, irritating, or otherwise fretting him. The action of the leg, like that of the hand, should be sensitively active and supple, exerting as little pressure as possible, but ready and in position to exert sufficient pressure to maintain the rider's seat and position under any and all circumstances. The horse must at all times be kept well up to the bit, and the rider will do well to remember that guiding the horse military fashion by the pressure of the reins on the animal's neck is not generally advised.

Pacing in America and *ambling* in England are practically the same gait. The two legs on each side rise and fall together. It does not call for any different method of riding than that employed for the walk. The *trot* is a diagonal pace, the right fore and left hind legs working together and alternately with the left fore and

right hind legs. It is possibly the most perfect pace of the horse. The body should be erect, but playing loosely from the hips, the legs must not be allowed to swing backward and forward, nor must the rider work his shoulders. The expert horseman rides by the aid of grip and balance, the former always ready should the balance be disturbed and there be any danger of a throw. The pressure of the legs should be according to the demand of the moment, ready to keep the rider from losing his balance, which latter saves the strain of a constant exercise of the grip. The *canter* is a very comfortable pace to the rider. It is not a natural pace, however, but, on the contrary, is fatiguing to the horse and particularly injurious to the animal's forelegs. When cantering in a circle, the horse should be made to lead with his inside leg, i.e. with the right leg if cantering to the right and with the left if cantering to the left. To secure this the rider when preparing to canter should pull the right rein rather tighter than the left one, so that the horse in describing a small portion of a circle will of necessity lead with the right leg.

The Gallop—In this pace the movements of the horse follow so quickly one on the other that the eye cannot detect the various positions which constitute a cadence. The first preparation for the rider is a firm seat, which should be well down in the saddle. The reins are shortened slightly, and the hands kept low, at the same time the body should be leaning slightly forward and a moderate grip maintained with the legs. Care must be taken that the horse is held together and restrained from breaking into a headlong gallop and possibly beyond the rider's control. To avoid this the reins are held somewhat tighter in the gallop than in any of the other paces.

Leaping requires good nerves as well as a good seat. The rider must be careful to maintain an upright position in the saddle until the horse is close to the jump, when (if it is a fence) he should swing well back from his hips, keeping his hands low and clear of the withers. The feet should be drawn back and never under any circumstances allowed to swing forward towards the animal's shoulders. Should the feet be forward and the horse make a mistake on landing, the rider would be more easily thrown than if his feet were in the proper position. In landing, the horse makes contact with the ground on one foreleg followed instantly by the other, after which come the hind legs. When jumping natural obstacles, such as water, ditch, etc., the general rule never to ride fast at an obstacle holds good, although expert horsemen interpret the rule to suit themselves, in any event, the rider must be careful not to pull at the reins or in any way check the horse in his effort to jump either water or ditch. Much depends on the horse in leaping, no two going at the jump in exactly the same style. One may need a little encouragement and another a great deal of steadying, so that it is an important essential for the rider to know his horse. When nearing the jump, the reins should be tightened so as to secure a firm hold of the head and at the same time make him shorten his stride so that he may the better gauge his distance. It requires some little experience on the part of the rider before he is able to tell when the horse is in his proper stride. When the animal is properly collected and is nearing

the obstacle, the hold on the reins should be relaxed, and care taken that the free action of his head or limbs is in no way interfered with by pulling, etc. On landing the rider should gently feel the animal's mouth. The horse will then collect himself, all four legs will make contact with the ground, and he will be away again without any hesitation.

The common vices of shying, bolting, kicking, rearing, etc., are much more serious in a horse kept for the saddle than in one used for driving. The horseman will usually be able to tell when his mount is about to shy, so that he will slacken the pace gently and at the same time keep a firmer hold upon the rein on the side towards which the horse is leaning. On no account should he prepare for it by giving his horse any intimation that something unusual is to happen: neither should he whip or spur, or, as is sometimes done, strike him on the head on the side towards which it is feared he will plunge. The important thing for the rider is to grip fast with the legs, preserve his balance and be careful not to hang on by the reins. If necessary, stop and encourage the horse by patting him on the neck and otherwise making much of him.

Perhaps the most dangerous vice next to rearing is that of *bolting* or *running away*, which in many instances, however, is only exuberance of spirits on the part of the horse which temporarily overcomes the control of the rider. With a skillful and ordinarily strong horseman it is very rarely that a horse runs away, but where bolting does happen the method of combating it will depend very much on the country and route the runaway selects. Where the route abounds with sharp turns or shut gates, the danger to be feared will be the running into a fence or gate, but on a road not much frequented and well known to the rider, it will generally be possible to guide the horse past any vehicle which may be met or overtaken. In such a case the rider should not hesitate to turn the rein around his hand and pull with all his strength towards the side he desires the horse to take. "Saving the mouth," though not horsemanship, is permissible, if by its employment only the runaway can be brought to a standstill. A kicking horse should be approached and treated very carefully, and if a vicious kicker should, if possible, be just as carefully avoided. The rider usually has some sort of warning, such as the laying back of the animal's ears, in which case he should sit well back and secure his grip. Only the expert horseman should attempt to ride a rearing horse, for no amount of nerve will suffice to guard the rider from the terrible injuries likely to occur if a rearing horse should fall back on him. Of all horses, the rearer should be the most carefully shunned. There is only one thing for the rider to do in such an emergency—to remember not to hold the reins tight or use them in any way as a support. On the contrary he should catch hold of the horse's mane, or place an arm round his neck and try in that manner to force him back on his feet.

Military horsemanship is designed to secure a uniformity of style and method, and the best results from both horse and rider. Long stirrups are used, the rider sits well down in the saddle, his seat being preserved largely by balance. *High school* riding is largely an accomplishment of the manege and includes skill in

horsemanship and in the performance of feats requiring a trained animal. Women are now taught to ride astride as well as by means of the sidesaddle. Hygienic reasons are advanced in favor of the former method, but authorities generally are doubtful of their reasonableness. A fair statement of the question would be that a poor horsewoman derives little benefit from either method and runs a minimum of risk of injury when riding astride. A clever horsewoman will invariably ride sidesaddle with a greater degree of comfort, enjoyment, and safety, than when riding astride.

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HORSE MEAT See HIPPOPHAGY

HORSE MUSHROOM See Colored Plate of FUNGI, EDIBLE.

HORSE MUSSEL The large mussel (*Modiola modiolus*) growing abundantly on salt meadows as well as under water. See MUSSEL.

HORSE NETTLE See SOLANUM, with Illustration.

HORSENS, hōr'sēns A seaport of Denmark, in the Province of Aarhus, situated at the head of the Fiord of Horsens, 32 miles southwest of Aarhus (Map Denmark, C 3). The town possesses a fine church with carvings of the seventeenth century, an old convent chapel, and a high school. The chief industries are weaving, ironworking, shipbuilding, and the manufacture of woodenware and lime. The town carries on an active trade, importing grain, hay, and fertilizers, and exporting dairy products, pork, and beef. Pop., 1906, 22,237, 1911, 23,843.

HORSE POWER A unit for the rate of work, or for the power represented by a force exerted through a path or distance in a unit of time, usually the minute, though sometimes the second, is taken. The term originated in the eighteenth century, when the mechanical force of expanding steam in engines was replacing the muscular force of horses in hoisting and pumping in the British mines. What number of horses formerly used would the steam engine replace? was the question asked. Experiment by Boulton and Watt using the massive dray-horses of England showed that a horse could lift 330 pounds at a rate of 100 feet per minute,

which of course was the same (if gearing were to be used) as lifting 33,000 pounds one foot in a minute, or 550 pounds one foot in one second. Accordingly steam engines at that time and since have been designed and sold on this basis. The quantity, however, must be used with reserve and care as the measure of the work which a horse can do in traction or otherwise. D'Aubuisson, taking the work of horses of lighter weight working on capstans at Freiburg, made the unit 16,440 foot pounds. Desagulier under similar circumstances made it 44,000 foot pounds. Smeaton, 22,000, Tredgold, 27,000. The horse can haul for a few seconds greatly in excess of this rate, for eight hours he will average less. A muscular man usually develops one-tenth of a horse power, but cannot keep this up all day.

In calculating horse power of mechanical motors the pressure in pounds per square inch exerted over the area in square inches which receives this pressure, when multiplied together, gives the total force in pounds. This force multiplied by the number of feet per minute through which this force is exerted gives the total of foot pounds. As often as 33,000 is contained in the total foot pounds, so many horse-power units will the motor develop. In the steam engine the mean pressure of each stroke multiplied by the piston area, each in square inches, gives the force in pounds per stroke, the stroke in feet multiplied by the number of traverses of the piston in the cylinder per minute gives the feet passed over. The product of these factors divided by 33,000 gives the horse power. In symbols

$$HP = \frac{P \cdot A \cdot L \cdot N}{33,000}.$$

The kilowatt (q.v.), or the electrical unit consisting of 1000 watts, is the electrical unit of rate of work, corresponding to 1.3405 horse power of mechanical work, and is being urged as a more defensible unit than the horse power which has been used for over a century.

HORSE RACING. The earliest recorded organized trials of speed with horses were the chariot races at the Greek national festivals, of which the most notable were the Olympic games (q.v.), held every fourth year. Greek sculpture frequently represents the horse as used for riding, apparently without a saddle in most cases, but not as so employed for sport, except as an incident to the chariot racing. On the other hand, the horses in the Roman contests were to a very great extent ridden. All the formalities of entering and of differentiation of classes and of starting were minutely laid down and followed, even to the color of the riders' uniforms. In the earlier times these Roman races were held on the open plain. There has always been a tradition in England that on Salisbury Plain, just outside Stonehenge, the remains of a Roman race course exist, and the oldest race which still takes place in England is run over a flat meadow just outside the walls of the Roman city of Chester. The natives, too, were great horsemen and charioteers, and contests were likely enough to be provoked at the feasts which the Romans took with them the world over. Their successors, the Saxons, maintained the use and training of the horse, when Hugh Capet sought the hand of the sister of King Athelstan, in the ninth century, he brought as a propitiatory present several "running horses." Fitzstephen,

in his description of the city of London, written at the end of the twelfth century, says that "races are common, of which the gentry and wealthy citizens are very fond." In the metrical romance of *Bevis of Hamtoun* we get our first account of a regular recurring annual meet of racing horses. In 1540 the mayor of Chester presented a silver bell to be given to the winner of a race five times round *The Roody*. The horse that won not only bore away the bell, but 8 or 10 pounds, "which moneys were collected of the citizens for that purpose." In the reign of James I (1603-25) public race meetings were held at Garterly in Yorkshire, Croydon in Surrey, Linton in Cambridgeshire, and on Enfield Chase. In the days of his successor, Charles I, Newmarket, now the metropolis of the racing world, first came into prominence, and Oliver Cromwell, whose farm at Coveney was only a few miles from Newmarket, bred and kept race horses. Charles II was a great patron of the turf.

The horses that practice flat racing are known the world over as thoroughbreds, yet, as a matter of fact, they are the product of cross-breeding continued for many centuries. Vegetius, who wrote in the fourth century, gave to African horses of Spanish blood the first place as chariot racers, but commended the Persian as the best saddle horse. James I bought a very celebrated Arab for breeding purposes, but the Darley Barb, imported in 1705, laid the foundation (through his great-grandson Eclipse, born 1764) of the modern turf. He was the sire of Almanza and Aleppo, but his best-known son was Flying Childers. This importation was followed by many others of sires and dams, among which the Taffolet Barb and the white-legged Lowther Barb are the best known. The Byerly Turk produced Highflyer, and the Godolphin Arab was the grandsire of Matchem. Among the horses whose names have become familiar may be mentioned Diomed (who won the Derby in 1780 and was exported to America), Bay Middleton, The Flying Dutchman, West Australian, Blink Bonny, Hermit, Galopin, Bend Or, Saint-Simon, Saint-Blais, Ormond, and Persimmon.

There is no radical difference between the methods of training horses for flat racing in England and America, except in the time of taking the foal in hand. In England the majority of foals are practically left to nature until well into the second year. In America, on the other hand, so considerate a trainer as W. E. Wishard would have them backed when weanlings at nine months and tried out when 15 months old. A thorough preparation for a great race is a long and troublesome operation, depending largely upon constitution, general capacity, and temperament. It has been found that practically the speed of almost all horses can be equalized by addition or subtraction of weight to be carried when running. See **HANDICAPPING**.

The most celebrated race course in England is Newmarket, established in 1667, where the Cambridgeshire, the Cesarewitch, the 1000-guineas, and the 2000-guineas are annually run. There are six meets there in the year, in May, July, and October, each occupying two weeks, with an interval of a week between them. The Derby (see **DERBY DAY**) has been run at Epsom since 1780, and the Oaks since 1779. The Ascot meeting has been continuous since 1727, and Goodwood since 1802. The other most im-

portant races are at Doncaster, Lincoln, Chester, and on the Curragh of Kildare, Ireland. The Jockey Club, a semipublic organization, is the flat-racing authority. In France within the last 30 years great interest has been taken in breeding and racing the thoroughbred. The Grand Prix de Paris, which is run at Longchamps, near the capital, is one of the great races of the world. Austria, too, has its enthusiasts, and in Australia flat racing is a national pastime.

In America the first and natural home of the thoroughbred was in the South, where the early settlers were of the class which in England made the breeding and care of high-mettled horses one of their delights. Many well-known horses were imported. Diomed, the Derby winner already mentioned, of the Byerly Turk blood, was one of them. He was brought over by Col. John Hoomes, of Virginia, and became the sire of Sir Archy, who in turn was the father of American Eclipse, Vingt Un, and other well-known horses. Another of these importations was Messenger, by Blais (the son of Flying Childers and grandson of the Darley Barb) out of Turf, a descendant of the Godolphin Arabian, thus combining on both sides the best thoroughbred blood in the world. Breeding continued with great success, so that in 1881 Pierre Lorillard was able to send over to England his Iroquois and win the Derby.

Even in the North flat racing flourished as early as 1812. In 1830 Barefoot, a Saint-Leger winner, found a home in Westchester, N. Y., and was raced there against his great rival, American Eclipse. The Wagner-Grey Eagle contests caused unparalleled interest there in the autumn of 1839, and Lexington and Le Comte had their famous meetings in New Orleans in 1854-55.

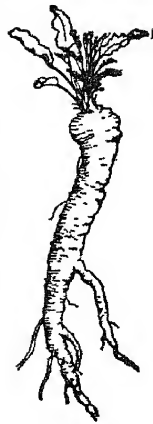
The Civil War was a temporary check to thoroughbred racing, and although scarcely a city of any size was without a course, it was not until the American Jockey Club was formed, with August Belmont (qv) as chairman, and Jerome Park (in 1886) was constructed by Leonard W. Jerome, that racing in the modern sense became a widely spread pastime. The Coney Island Jockey Club at Sheepshead Bay, the Brooklyn Jockey Club at Gravesend, the Brighton Beach Racing Association at Brighton Beach (all in Brooklyn), the Westchester Racing Association, at Morris Park, N. Y., the Monmouth Park Jockey Club, at Long Branch, N. J., and minor tracks at Elizabeth and Linden, N. J., followed. Enormous sums were added by the clubs to the entry fees, and racing was at the height of its popularity. The Board of Control, made up of race-track and race-horse owners, was formed, and, under the Ives Pool Law, which permitted open betting, New York City became racing mad. Scandals became frequent, and under great agitation the Ives Law was repealed. Members of the Coney Island, Brooklyn, and Westchester clubs got together and formed the Jockey Club in 1894, and stringent rules regarding racing were enacted. The Gray-Percy Racing Law was passed, and betting was made punishable by civil suit when carried on within a race track and made a felony outside its gates. A State Racing Commission was instituted (1895) and the tracks racing under the law were taxed 5 per cent of their receipts for the benefit of the agricultural fairs throughout the State. Under this control the Aqueduct, Ja-

maica, and Queens, L. I., tracks were built—the first two, new organizations and the last named, Belmont Park, a magnificent race course, to take the place of Morris Park. Saratoga's track was bought by members of the Jockey Club and restored to much of its old popularity.

The demoralizing effects of this wholesale public gambling, and the rank dishonesty of the methods under which much of the racing was conducted, finally aroused and crystallized intelligent public opinion against it in various parts of the country. In 1905 Illinois passed laws forbidding race-track betting, and this put a stop to racing in Chicago. In New York it received its deathblow in 1908 from Gov. Charles E. Hughes (qv), who, in spite of most powerful and unscrupulous opposition, forced the Legislature to pass acts (chaps. 506, 507, 131st Session, June 11) declaring horse racing for stakes a public nuisance (with certain exceptions) and making pool selling, bookmaking, betting, etc., misdemeanors. This practically put an end to racing in New York. In 1914 a decision of the Appellate Court of the State held that individuals as such could make and record bets but this decision did not materially change the effect of the law of 1908, so far as racing in the State was concerned. Consult Cook, *History of the English Turf* (3 vols., New York, 1904), Watson, *The Racing World and its Inhabitants* (London, 1904), Busbey, *Trotting and Pacing Horses in America* (New York 1904) and *Recollections of Men and Horses* (ib., 1907), Parlin, *American Trotter* (Boston, 1905), Trevathan, *American Thoroughbred* (New York, 1905), *American Trotting Register* (Chicago, issued annually). See TROTTING.

HORSE-RADISH (*Cochlearia armoracia*)

A perennial herb of the family Cruciferae, with long, cylindrical white roots of strong pungence, due to a volatile oil which resembles mustard oil. It has flower stems about 2 feet high, large, much-veined, oblong, crenate root leaves on long stalks, and elongate-lanceolate stem leaves. It grows in damp meadows in the middle and south of Europe, is naturalized in many places in America, and is cultivated for the sake of its roots, which are scraped or grated down and mixed in salads or used as a condiment. Horse-radish root is used also in medicine as a stimulant and is often useful in promoting digestion, it is also regarded as an antiscorbutic and is sometimes applied as a rubefacient instead of mustard. Since horse-radish does not produce seed, it is generally propagated by root cuttings planted in rich, moist soil and treated as an annual. The crowns are also sometimes used, but they do not produce as good roots. Horse-radish is very difficult to eradicate from the ground in which it has become established, as almost any portion of the root will grow.



ROOT OF
HORSE-RADISH.

HORSE-RADISH TREE (*Moringa pterygosperma*, by some written *Moringa moringa*). A tree of the family Moringaceae, native of India, and introduced into the West Indies and other tropical countries, in many of which it is cultivated for its fruit, which is either pickled or

eaten as a vegetable. The fresh root and the leaves suggest the odor and flavor of horse-radish—hence the common name. Its winged, triangular, globose, bitter seeds furnish about 30 per cent of a bland, inodorous, nearly colorless fixed oil of long-keeping qualities which resembles olive oil and is similarly used. At a temperature of about 32° F a deposition of its solid fats occurs, and the remaining clear fluid is removed for use in the extraction of perfumes from flowers and the lubrication of delicate machinery. The oil is known as ben oil or behen oil—a name which is said to be misapplied, since it is claimed properly to belong to the oil obtained from the wingless seeds of *Moringa aptera*, a tree native to Abyssinia and Arabia. The oil of neither species should be confounded with bene oil, which is derived from the seeds of *Sesamum indicum* (See SESAMUM). In Australia the name "horse-radish tree" is given to species of *Codonocarpus* on account of the pungency of the leaves.

HORSESHOE BAT See BAT

HORSESHOE, or HORSEFOOT, CRAB

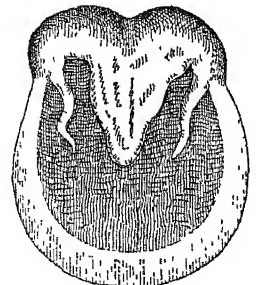
See KING CRAB

HORSESHOE FALL. The name given to the portion of Niagara Falls included between Goat Island and the Canadian shore, also called the Canadian Fall. See NIAGARA RIVER AND FALLS

HORSESHOEING. An artificial protection of some kind for the horse's foot has been well said to be "one of the penalties which civilization inexorably exacts." When it is remembered that every time that a horse is shod it implies damage to the foot and that the best and most expert shoeing of necessity inflicts some injury, the importance of horseshoeing to the horse owner is evident. All authorities agree "that there is no such thing as absolute immunity from an evil which must always exist in inverse ratio to the skill displayed in the execution of the work." The value of the domesticated horse to man is in his fleetness and strength. It was early discovered, however, that his usefulness was limited by the condition of his feet, so that the history of horseshoeing is practically an account of the various devices that have led up to the modern shoe.

The entire weight of the body, as well as the pressure of every muscular effort, is largely concentrated in the feet. The nails or claws and their corresponding digits of other animals have in solipeds disappeared from atrophy, with the exception of the middle digit, which became much more developed and surrounded by an hypertrophied nail called the hoof, the structure of which is designed to meet every requirement of the animal except those that have devolved upon it since its domestication, such as constant traveling over hard roads or stony ground. Should the horn of the hoof be worn away, the structures which it was designed to protect are of necessity injured, the animal becomes lame, unable to work, and consequently ceases to have any value. According to Diodorus, Cinnamus, and Appian, entire armies were occasionally jeopardized through the breaking down of their horses by reason of worn hoofs. Xenophon sought to solve the problem by making the hoofs hard and tough, and from other Greek and Roman writers we learn that resort was had to socks or sandals (*oppopodes, embatai, carbatinar, solea*, etc.). These were clumsy as well as ineffectual means of protection; but, strangely

enough, they have their modern counterpart in the straw sandals still to be seen in various parts of the Japanese Empire. According to Beckmann, *Beitrag zur Geschichte der Erfindungen* (Leipzig, 1792), it was greatly to be doubted whether the Romans practiced, as was alleged, the art of shoeing, by attaching a metal plate or rim to the horse's foot—a doubt strengthened by the fact that on no monuments or sculptures (so far as was then known) in which horses appear could any evidence of shoeing be seen. On the other hand, a bas-relief dating from the second century, at present in the museum of Avignon, shows a chariot drawn by horses which are unmistakably shod, and Cohen, in his *Description des monnaies frappées sous l'empire romain*, tells of a medal supposed to date from the time of Domitian commemorating a cavalry victory upon which was a design of two horseshoes, surrounded by two twined serpents. Another coin, in the British Museum, from Tarentum, about 300 B.C., is supposed to represent a horse being shod. According to historical writers the horses of the Huns when they invaded Europe were shod. Some evidence that nail shoes were employed previous to the sixth century is perhaps supplied by Chifflet (*Monuments de la monarchie française*), who tells of a fragment supposed to be part of a horseshoe found by him at Tournay in the tomb of Childeric (King of the Franks, died 481 A.D.). Absolute evidence as to nail shoes in the ninth and tenth centuries is comparatively plentiful, not the least important being the *Tactica Imperatoris Leonis* of Emperor Leo VI, dating from the ninth century. There is no reason to doubt that the Arabs of the Hejra (622 A.D.) shod their horses with iron, while, according to the *Chroniques de Saint-Denis*, Charlemagne was capable of breaking with his hands an "iron" shoe belonging to his horse. In the nature of things it was not likely that shoeing with iron was at all common in the early part of the Middle Ages. William the Conqueror is believed to have introduced the art into Britain. For centuries the art of the shoemaker ranked with that of the scholar and baird in England and France, and not only noblemen, bishops, and squires, but even kings, practiced the craft. In fact, according to Solleysel (c. 1665), a knowledge of the art was a necessity for all persons of high estate, which explains the fact that many of the oldest families of England, France, and Poland have to-day a horseshoe device in their insignia. Occasionally shoeing took the form of extravagance, as when Poppæa, the wife of Nero, had her mules shod with shoes of gold—a fantastic fashion often recorded in history. As late as 1616 the English Ambassador to France entered Paris riding a horse whose silver shoes were so lightly fastened on that when he came to a spot where "eminent men or beautiful women were standing" he caused his steed to prance, and so cast its shoes, which were scrambled for by the crowd.

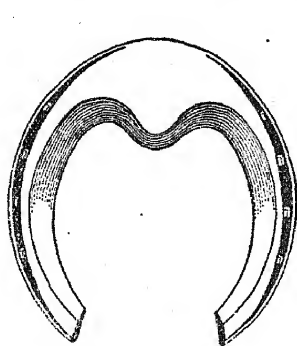


NORMAL FOOT READY FOR SHOEING
Illustration of healthy frog and bars

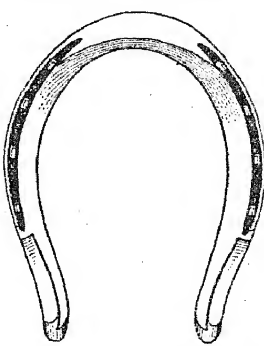
His "argentier," wearing a rich livery, replaced the shoes with similar ones just as loosely fastened.

Modern Horseshoeing. The advanced farriery of to-day owes its excellence to modern veterinary science; so that there is no longer

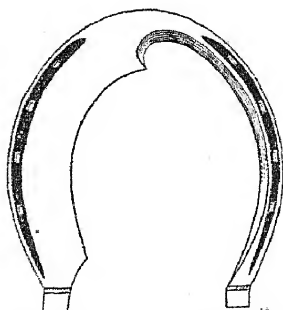
the frog helps to maintain the natural expansion of the hoof—a vital function which is entirely destroyed by the too common use of the "drawing knife," and which converts what should be a means of protection into a source of danger. The further fault of paring down the sole until



TOE-WEIGHT SHOE.



SHOE TO BALANCE ACTION; HIND FEET.

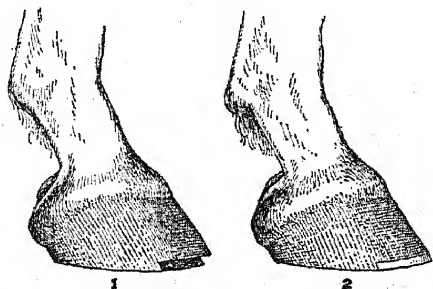


SIDE-WEIGHT SHOE FOR HIND FEET.

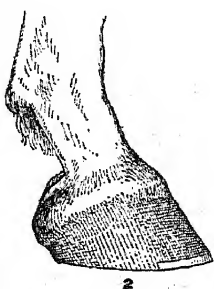
excuse for the ignorance which in comparatively recent times was universal, and which even to-day is prevalent to some extent. Notwithstanding State examinations and increased general knowledge, it is admitted that the horse's feet are unnecessarily mutilated by wholesale cutting, regardless of the anatomy, physiology, and economic relations of the parts of the hoof. This

the living structures within are almost exposed through the soft, moist, half-formed horn, which is all that the paring knife has left, is very severely condemned. Bad farriery and shoeing are frequently guilty of still further maiming the horse in endeavoring to improve upon nature by removing the bars, or "opening" the heels; such a foot becomes predisposed to contraction of the heels. In the effort to use a shoe too small for the foot the rasp is brought into play, and the foot made to fit the shoe. It is generally conceded that the outside or horny wall of the hoof, together with that portion of the sole which is in immediate contact with it, and upon which the shoe should rest, are the only portions which require paring, and then not with the knife, but with the rasp. There is considerable difference of opinion among authorities with regard to the various details of shoeing, but all are agreed on the barbarity as well as uselessness of the frog and sole mutilation already described.

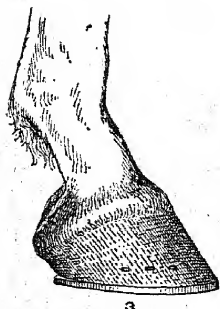
The shoe should be as light in weight as the circumstances will permit, the determining factors being the weight of the horse and the nature of the work it must do. The old adage that "an ounce at the toe means a pound at the withers" is undoubtedly true in essence, but a still greater handicap is the increased concussion inseparable from progression. It is not true that a heavy shoe necessarily wears longer than a light one, while it is well known that a light shoe is just as effective as a heavy one in performing its legitimate mission of preventing undue wear of the walls of the hoof. The shoe should be made to conform exactly to the natural tread of the foot and should be permitted on no account to remain on for too long a time, as the truncated cone of the hoof, which has its base downward, constantly increases in circumference, so that in time the shoe becomes too small and a source of pain to the horse. Common errors in shoeing are the employment of too many and too heavy nails and the driving of them too high up into the walls. If shoes could be securely attached and safely worn without the use of nails, much would be gained; but although numerous alternative devices have been put on the market, the best of which fastens the shoe by means of metal bands or



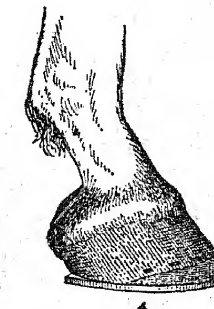
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FIG. 1. FOOT PREPARED FOR CHARLIER TIP.
FIG. 3. RIGHT FITTING SHOE.

FIG. 2. THE CHARLIER TIP.
FIG. 4. WRONG FITTING.

practice is followed solely on the score of tradition; and, great as the financial loss has been, it is little compared to the agony which horses have endured. The frog of the hoof is designed to act as a cushion which by its elasticity protects the other structural parts from jar and harmful concussion. Normally the resilience of

stubs, none has been found to be generally satisfactory

Winter shoeing demands that the shoe be capable of affording foothold as well as protection against undue wear, and for this purpose shoes are made fashioned with toe and heel calks, or calkins. Care is necessary to avoid making the calks any larger than is absolutely necessary, or else serious injury may be done to the horse. The art of shoeing for specific purposes is of American origin and is a result of the development of the trotter. At first designed to influence speed or action, shoes are now made to remedy defects, natural or acquired, due to faulty conformation or bad habits. Shoes for racers, trotters, and speed horses generally have an adaptable variety of form and principle. Among those designed to remedy defects in the horse most generally employed in the business and pleasure of the community at large may be mentioned the scooped-toe or roller-motion shoe for the forefeet and a shoe for the hind feet, designed to do away with "forging," or "clicking." The scooped or rolled toe hastens the action of the forelegs and enables them to avoid being struck by the hind foot, while the lengthening of the branches of the hind shoes, by increasing the ground surface, retards the "breaking over" of the hind foot. A common practice to open the action is to increase the outside web of the hind shoes. The faults of "dishing" or "padding" are remedied by similar devices. The principal diseases common to neglected or faulty shoeing will be found treated under HORSE, or under their own title throughout the work.

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HORSESHOES, LUCK OF See SUPERSTITION

HORSESHOE SNAKE (so called from its markings). A large, handsomely marked colubrine serpent (*Zamemis hippocrepis*) of the Mediterranean region, closely allied to the American black snake.

HORSE-TAIL', or **HORSETAIL RUSH** (so called from the shape). A common name given to species of *Equisetum* (scouring rush), a genus which is the only living representative of one of the great orders (Equisetales) of Pteridophytes. See **EQUSETUM**.

HORSETAIL FUNGUS. See **Colored' Plate of FUNGI, EDIBLE**

HORSFORD, EBEN NORTON (1818-93). An American chemist, born at Moscow, Livingston Co, N Y. He graduated as a civil engineer at the Rensselaer Polytechnic Institute in 1838 and was engaged during the following year on the geological survey of New York State. In 1844 he went to Germany and studied chemistry

for two years under Liebig. From 1847 to 1863 he held the Rumford professorship on the application of science to the useful arts at Harvard College. He left Harvard to engage in chemical manufactures. He endowed the library and laboratory of Wellesley College. He was interested in antiquarian research and was generally credited at one time with having identified the site of the supposed Norse settlement Norumbega (qv) as being on the Charles River near Boston. His dictionary of the Iroquois and Algonquin languages is a valuable contribution to Indian philology. He published *The Discovery of Norumbega* (1892).

HORSLEY, HORSLEY, ALFRED E. See ORCHARD, HARRY

HORSLEY, JOHN CALLCOTT (1817-1903). An English genre painter, born in London. He studied at the Royal Academy's schools, became R A in 1864, and treasurer in 1882, retiring in 1897. He received several prizes for his cartoons at the Westminster Hall competition in 1843 and painted all fresco the "Spirit of Religion," in the House of Lords, and "Satan Touched by Ithuriel's Spear," in the Poet's Hall of the palace of Westminster. Some of his easel paintings are: "Malvolio in the Sun", "L'Allegro" and "Il Penseroso," both done for the Prince Consort, "Caught Napping", "Scenes from Don Quixote", "Healing Mercies of Christ", "Hide and Seek." During the eighties, on account of his energetic protests against nudes, he was referred to by *Punch* as Mr J C (lothes) Horsley. The color of his pictures is good, but the motives are often stained. He wrote *Recollections of a Royal Academician* (New York, 1904), and for many years was prominent in organizing the winter exhibitions of "Old Masters" at Burlington House.

HORSLEY, SAMUEL (1733-1806). An English prelate. He was born at St Martin's Place, London, Sept 15, 1733. He was educated at Westminster School and Trinity Hall, Cambridge. In 1758 he became curate to his father, then rector of Newington, and the next year succeeded to the rectory, a living which he held for 34 years, though he also enjoyed in the interval many other preferments. In 1781 he became Archdeacon of St Albans. He was a scientist as well as a theologian and first attracted attention by scientific writings. In 1779-85 he edited, with a commentary, the works of Isaac Newton. He is chiefly remembered, however, for his controversy with Dr Joseph Priestley, growing out of the publication of the latter's *History of the Corruptions of Christianity* (1782), among which corruptions was included the doctrine of Christ's uncreated divinity. Horsley reviewed the work with great severity in his charge delivered to the clergy of the archdeaconry of St Albans, May 22, 1783. Priestley replied the same year in a publication entitled *Letters to Dr Horsley in Answer to his Animadversions, etc.* In 1784 Horsley retorted in 17 *Letters from the Archdeacon of Saint Albans in Reply to Dr Priestley, etc.* These were, in return, met by a new series from Priestley. After a silence of 18 months Horsley again replied in his *Remarks on Dr Priestley's Second Letters, etc.*, and in 1789 collected and published the whole that he had written on the subject. His services were rewarded with the bishopric of St David's in 1788, whence he was translated to the bishopric of Rochester in 1793, then to St Asaph's in 1802. He died at

Brighton, Oct 4, 1806 His collected theological works were published (London, 1845)

HORSLEY, SIR VICTOR ALEXANDER HADEN (1857-1916) An English surgeon and neurologist He studied medicine in London at University College Hospital, from which in 1881 he received the gold medal in surgery He was elected president of the Medical Defense Union and of the pathological section of the British Medical Association (1892-93) and a fellow of the Royal Medical-Chirurgical Society and became a member of numerous important scientific societies at home and abroad For many years he was professor of clinical surgery and consulting surgeon at University College Hospital (emeritus, 1906), and he was professor superintendent of the Brown Institution (1884-90), Fullerian professor at the Royal Institution (1891-93), and professor of pathology at University College (1893-96) He was secretary of the Government Commission on Hydrophobia in 1885 and a year later became surgeon to the National Hospital for Paralysis and Epilepsy In 1902 he was knighted The results of his researches in cerebral localization are of the greatest value and have made him eminent He is the author of a *Report on Septic Bacteria* (1882), articles in *Heath's Dictionary of Surgery* and *Quain's Dictionary of Medicine* (1883) *Surgical Reports of University College Hospital* (1882 and 1883), "Functions of the Marginal Convulsions," in *Proceedings of the Royal Society* (1884) and *Philosophical Transactions of the Royal Society* (1888) "Analysis of Movements Produced by Stimulating Ferrier's Cortical Arm Centre" (1b, 1886-89), "On the Thyroid and Pituitary Bodies," in *British Medical Journal* (1886), *The Pathology of Epilepsy and Canine Chorea* (1885-86), "On the Functions of the Thyroid Gland," in *British Medical Journal* (1885); *Brain Surgery* (1887), "On Localization of Disease in the Cerebrum," in *International Journal of the Medical Sciences* (1887), *Hydrophobia and its Treatment* (1888), *An Experimental Investigation of the Central Motor Innervation of the Larynx* (1890), with Felix Semon, *The Structure and Functions of the Brain and Spinal Cord* (1892), *Preliminary Report on Oedema* (1893), with Boyce, *Experiments upon the Functions of the Cerebral Cortex* (1888), with Schafer

HORSTMANN, hörst'man, August (1842-) A German chemist, born at Mannheim He was educated at the universities of Heidelberg, Zurich, and Bonn, and became a lecturer in 1867 and professor in 1872 at Heidelberg He became known especially for his work in theoretical chemistry He was the first to formulate the theory of the loss of heat, and he worked out the conditions of chemical equilibrium He wrote for the third edition of *Graham-Otto's Lehrbuch der Chemie* (1885) and published *Abhandlungen zur thermodynamik chemischer Vorgänge* (1903)

HORSTS. A name introduced by Eduard Suess and now generally used by geologists to denote those blocks of the earth's crust which retain their position during the general subsidence of the structure Such blocks are bounded by faults along which the adjacent areas have sunk, leaving the included masses as protuberances The Black Forest and Vosges highlands are examples of horsts, flanked by areas of subsidence The opposite condition is found in a *graben*, which signifies a sunken block between

parallel fault lines The basin occupied by Lake George, N Y, is an example of such a depression, as shown by the series of rocky cliffs on both sides and the precipitous shore lines The middle Rhine valley has a similar character

HORT, FENTON JOHN ANTHONY (1828-92) A distinguished British theologian He was born of English ancestry at Leopardstown near Dublin, Ireland He was educated at Rugby and at Cambridge, where he was a fellow of Trinity College (1852-57) He was vicar of St Ippolyts, Hertfordshire (1857-72), and at Cambridge was lecturer (from 1872) and professor from 1878 to his death Hort was one of the most learned men of the nineteenth century He distinguished himself not only by his marvelous attainments in classical and patristic literature, but by an extensive acquaintance with botany and mathematics Nevertheless he was always reluctant to publish the results of his studies The great monument of his life work is the *Westcott-Hort Greek Testament* (1881) For more than 30 years he made the Greek text of the New Testament his chief study and at his death was one of the first authorities in the world on this subject To him textual criticism owes the clear and convincing exhibition of the principles of genealogical evidence presented in the *Introduction to the New Testament in Greek* (1881) Since his death many of his lectures have been edited and published Consult Sir A J. Hort, *Life and Letters* (New York, 1896)

HORTA, hör'ta, Portug pron ör'ta A seaport of the island of Fayal, Azores, and capital of the District of Horta (Map Spain, A 4) It has a safe and good harbor Pop, 1900, 6734. 1910, 6037

HORTEN, hör'ten, MAX (1874-) A German Orientalist, born at Elberfeld and educated at Fribourg and Bonn In 1898-1900 he traveled in Egypt and Palestine In 1911 he succeeded Jacob as professor of Oriental languages at Erlangen and in 1913 refused an invitation to become head of the Khedive's library in Cairo He edited and translated important Arabic texts, especially philosophic, and wrote *Die philosophische Probleme der spekulativen Philosophie im Islam* (1910) and *Die philosophischen Systeme der spekulativen Theologen im Islam* (1912)

HORTENSE EUGÉNIE DE BEAUHARNAIS, ör'tans' ézhá'ne' de bō'ar'ná' See BONAPARTE.

HORTENSIO, hör-tén'shī-ō A suitor of Bianca, the younger sister of Katharine, in Shakespeare's *Taming of the Shrew*

HORTENSIVS, hör-tén'shī-ūs, QUINTUS (c 350-286 B C) A Roman legislator His *Lex Hortensia*, passed in his dictatorship (286), after the plebs had seceded, decreed that the resolutions passed by the plebs (technically called *plebiscita*) were binding on the whole people, without approval by the senate, and so brought to an end the struggle between plebeians and patricians Hortensius died while he was dictator Consult G W. Botsford, *The Roman Assemblies* (New York, 1909)

HORTENSIVS, QUINTUS, surnamed **HORTALUS** (114-50 B C) A Roman advocate and orator, a contemporary of Cicero, with whom he was personally on good terms, though opposed to him in politics Hortensius had already obtained a name as an orator before he was 20, and he passed through the several grades of the public service, as *quæstor* in 81, *ædile* in 75, *præ-*

for in 72, until he obtained the consulship in 69, afterward, about 61, he withdrew largely from politics and devoted himself to pleading in the courts. In 70 he opposed Cicero in the famous case of Veires (qv), from this time he was eclipsed as orator by Cicero. He was an effective though florid orator, with a marvelous memory and a fine voice, but often showed himself unscrupulous. He wrote on oratory, composed poems and a historical work called *Annales*. None of his orations or writings has been preserved. Consult Sandys, edition of Cicero's *Orator*, p. xl (Cambridge, 1885). Sears, *History of Oratory* (Chicago, 1903), Schanz, *Geschichte der römischen Literatur*, vol. 1, part II (3d ed., Munich, 1909).

HORTI CÆSARIS. See CÆSAR, GARDENS OF **HORTICULTURAL SOCIETIES.** Associations for the encouragement of gardening. They are now numerous in almost all civilized countries, but seem to derive their origin only from the beginning of the nineteenth century, when the London Horticultural Society was formed. The society obtained a charter in 1808. The Experimental Garden of the society, the first of its kind, was established in 1817 and was removed to its present situation at Chiswick in 1822. The progress of the society was very rapid, and its usefulness is still very great. Societies of the same kind soon began to spring up in Germany and other parts of the continent of Europe and now exist in almost all parts of the civilized world. In the United States there are about 500 horticultural societies. The New York Horticultural Society, organized in 1818 and now extinct, was the first to come into existence. The American Pomological Society, established in 1850, is now one of the strongest organizations of its kind in the world. The purpose of these societies is education and the development of interest along horticultural lines.

HORTICULTURE (from Lat *hortus*, garden + *cultura*, cultivation, from *colere*, to cultivate). The branch of general agriculture that deals with the raising of fruits, vegetables, and ornamental plants. On the one hand, horticulture merges into agriculture in its restricted sense, i.e., the raising of cereal, forage, textile, and root crops, on the other into landscape gardening, which is really a fine art. To illustrate, peas raised to be used as an esculent are classed as a horticultural crop, but if grown for the dry seed they are considered an agricultural crop, the names "garden peas" and "field peas" sufficiently indicate the distinction. Again, plants raised for their intrinsic ornamental merit are properly subjects of horticulture (see **FLORICULTURE**, **FORESTRY**); but if their primary use is as units in a general landscape effect, they are subjects of landscape gardening (qv). While the development of agriculture, in the restricted sense of the term, springs from sheer necessity, that of horticulture, which serves to gratify the sense of beauty and the desire for comfort, naturally implies a state of communal or national ease, of thrift, and even luxury. This fact is emphasized by the time at which horticulture becomes industrially important in a nation's history. For it attains commercial importance in a community only when the pioneer days have passed, when the rugged soil has been educated by the practices of general farming, and prosperity seeks new channels by diversification of interests.

But horticulture is really much less simple

than may be inferred from the ordinary definition of its scope. Problems of plant physiology, of breeding and variation of plants under domestication, of the operation within its domain of natural laws in opposition or in conjunction, of the life histories of innumerable organisms, such as insects, mites, bacteria, and microscopic fungi, are closely connected with the ordinary problems of horticulture proper and render it an art of great complexity. Further, with its growth, which, especially in America, has been phenomenal, many industries such as the nursery and the seed industries, the manufacture of tools and implements, of artificial fertilizers, baskets, barrels, tins, jars, and other packages, the preparation of canned, evaporated, or otherwise preserved fruits and vegetables, storage by refrigeration, the transportation of all materials for manufacture and of the finished product—these and other industries have either sprung into existence or have been vastly increased in magnitude with the development of horticulture. Moreover, since each of its branches may be carried on in the open air or under glass by specialists, since each species, and in many instances each variety, cultivated, demands some special knowledge of its peculiar needs since a total of fully 25,000 plants, some of which have thousands of varieties, are cultivated for use or ornament: since climates, soils, and other conditions differ as widely as do details of raising, since markets are as whimsical in their demands as persons and finally, since improvements and discoveries in plants, varieties, methods of culture, marketing etc., are annually reported—it is apparent that the realm of horticulture is exceedingly broad.

The main divisions of horticulture are floriculture, or flower growing, pomology, or fruit growing, and olericulture, or vegetable growing. Each of these divisions may be further subdivided into amateur and commercial branches—the former dealing with personal ideals, the latter with commercial demands. Of course, these two are blended to some extent, and it should be noted that examples of the former are annually increasing to the no small advantage of the community, the nation, and the world.

The ancient methods of gardening were so crude, the means of disposal so limited, and the areas devoted to horticultural industry, if such it might be called, so small, that the term "horticulture," as now understood, if applied to that early gardening would be a misnomer. Not until within the past 200 years was the term more than occasionally employed, and only during the past century did it come into general use. As proof of the interest taken in horticultural matters during the nineteenth century may be mentioned the development in America of a horticultural literature. In 1800 there were very few agricultural works that devoted more than a few chapters or even pages to fruits and vegetables. The first American horticultural book was published in 1804. Not only was there at the time no periodical devoted wholly to horticulture, but there was none that had even a horticultural department. Not until 1821 did a horticultural column appear in the *Massachusetts Agricultural Repository*, the first agricultural journal printed in America. During the nineteenth century fully 600 books were published and the total number had increased to over 1200 books by 1914. During this period 500 horticultural journals were started, of which about 50 were in circulation in

1914 The tendency of recent horticultural literature has been to substitute for the long series of specific rules formerly popular a set of general principles, which, if thoroughly grasped, might enable the reader to judge as to what working method may best suit any given case under any combination of local conditions. Outside of North America, during the past century, the development of horticulture, though less marked, has been, nevertheless, very remarkable as compared with previous centuries.

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HORTI LUCULLIANI See LUCULLUS, GARDENS OF

HORTI MÆCENATIANI, or MÆCENATIS. See MÆCENAS, GARDENS OF

HORTON A city in Brown Co., Kans., 49 miles north of Topeka, on the Chicago, Rock Island, and Pacific Railroad (Map Kansas, G 3) It is located in a farming and stock-raising district and has railway repair shops, machine shops, culvert and broom factories, etc. It is governed under a charter of 1887 by a mayor and a council. There are municipal water works and an electric-light plant. Pop., 1900, 3398, 1910, 3600

HORTON, ROBERT FORMAN (1855-) An English Congregational minister. He was born in London, was educated at Shrewsbury and at New College, Oxford, of which he became fellow in 1879, and where he was lecturer in history until 1883, and in 1880 became minister of Lyndhurst Road Church, Hampstead. He was chairman of the London Congregational Union in 1898 and of the Congregational Union of England and Wales in 1903. Dr. Horton delivered the Lyman Beecher lectures on preaching at Yale in 1893 and in 1909 was again in America for the seventy-fifth anniversary of Hartford Theological Seminary. He wrote many volumes—sermons, biographies, and devotional works—including *Inspiration and the Bible* (1887), *Revelation and the Bible* (1893), *The Apostles' Creed* (1895), *John Howe* (1895), *Oliver Cromwell* (1897), *Alfred Tennyson* (1900), *The Pastoral Epistles* (1901), *The Bible as a Missionary Book* (1904), *The Early Church* (1908), *Great Issues* (1909), *My Belief* (1909), *The Hero of Heroes* (1911), *National Ideals and Race Regeneration* (1912)

HORTON, SAMUEL DANA (1844-95). An American publicist, born in Pomeroy, Ohio. He graduated at Harvard College in 1864 and at

the Harvard Law School in 1868, studied in Berlin from 1869 till 1870 and was admitted to the bar in Ohio in 1871, practiced in Cincinnati until 1874 and afterward in Pomeroy. He was among the first to argue the advantage of the establishment of an international ratio between silver and gold. In 1878 he served as secretary of the International Monetary Conference assembled in Paris and was a delegate to the second conference held there in 1881. His most important writings are *The Monetary Situation. An Address* (1878), *Silver and Gold. Their Relation to the Problem of Resumption* (1880), *The Silver Pound and England's Monetary Policy since the Restoration*, together with *The History of the Guinea* (1887), *Silver in Europe* (1890)

HORTUS SICCUS See HERBARIUM

HORUK, hō'ruk. The name of a Greek pirate, also called Barbarossa (q.v.)

HORUS (Lat., from Gk. Ὄρος, Egyptian Hōr) An Egyptian deity. His name Hōr(u) is by some scholars explained as meaning "the superior, highest," but this is an improbable etymology, not more probable, perhaps, than the earlier comparison with Hebrew ḥōr (light), which is generally ridiculed at present. It is questionable where Horus had his original local cult, usually Edfu, where a large temple is still standing, is considered to have been the locality, although the god was worshiped at a great many other places. He was patron of Upper Egypt. On the very earliest monuments we find Horus as the chief god and type of the King, from the first the hawk is his symbol, and there are allusions to his antagonism to Set, so that the later theological ideas seem to be traceable to the time of the first dynasty. The original dominating position of Horus within the pantheon is shown by the fact that his hawk stands as hieroglyph for "god" in general. He appears as a sky god, then he personifies the sun, originally thought to fly over the sky in form of a hawk, and is usually represented as a young warrior with the head of a hawk, wearing the crown of Egypt. More specially he personifies the young sun, rising victoriously in the morning out of the hostile darkness. Therefore he is connected with Osiris, the sun dying in the west, and as his son he takes vengeance for his father on the powers of darkness. More rarely he is called the son of Rê, the midday sun. He is frequently called a posthumous son of Osiris, and after the nineteenth dynasty he is constantly represented as the son of Isis, who is even said to have formed him from the mutilated members of her murdered husband. Rising gloriously, Horus begins the fight with Set-Typhon, his wicked uncle, every morning—although later (partly euhemeristic) views consider the great fight between the gods as a single event, occurring at the beginning of the world. Avenging his murdered father, Horus overthrows and emasculates Set; but he loses one eye in the contest. Possibly this refers to the moon, which loses its light every month, or else the sun may be the single eye in the face of the god, i.e., the sky. The wounded eye is healed by the moon god (Dhouthi, Thoth), which means that the second eye appears in the night. The blood of the wounded eye drips down and creates plants, animals, and all good and useful things on earth. It is curious to note how Horus is differentiated in regard to his various functions and phases. We find, e.g., Harpocrates (Horus as a child) distinguished from

Harokeris (the adult Horus), Harondotes (Egyptian Harnet-hotef, the avenger of his father), Horus in Khemmis, as a babe hidden by his mother in the marshes of the Delta from the persecutions of Set, Harmachis (qv), "Horus uniting both lands", and various other forms became localized and had their special cults. Many details of the Horus myth are obscure, e.g., the legend that he once cut off the head of his mother, which may have been borrowed from an Asiatic cosmogonic myth. The later theology explained this story by the statement that Isis had set free the wicked Set after Horus had delivered him to her in fetters, and that Horus mutilated her in his indignation at her act. The moon god (see above) replaced the head of Isis by a cow's head. The story of the fight against Set-Typhon is told with a great many variations, and the wicked adversary and his many helpers resist Horus in many forms and at many places. Later, the serpent Apap, as the personification of night and the hostile ocean, became confounded with Set (qv). The later Egyptians, under Greek influence, made strange attempts to harmonize these hundreds of different, contradictory myths (Consult especially Plutarch's *De Iside et Osiride*, and the accounts given by Diodorus). Like Osiris, Horus was explained as typifying everything good in nature, although the solar meaning of most of the mythological facts was too manifest to be entirely overlooked. The planets Mars, Jupiter, and Saturn were also considered as manifestations of Horus ("the red Horus," "the brilliant Horus," "Horus the bull"). In the mythical accounts of the early history of Egypt Horus was counted as the last of the divine rulers of the land. The principal temples of Horus were at Letopolis, in Lower Egypt, at Kus (Apollinopolis Parva), and at Edfu (Apollinopolis Magna—the Greeks identified Horus with their Apollo), he was worshipped also at Ombos, Denderah (Tentyra), Damanhur (Hermopolis Parva), etc. In Imperial Rome he became as popular as Isis and the other members of the Osirian family. See PLATE of EGYPTIAN DEITIES, in the article EGYPT. Consult E. A. T. W. Budge, *The Gods of the Egyptians*, passim (London, 1904).

HORUS An Egyptian name, usually understood as that given by Manetho to the last King of the eighteenth dynasty, the Har-em-heb of the hieroglyphic inscriptions. He had been Prime Minister of several of his predecessors, and by marrying a princess he ascended the throne somewhat after 1380 B.C. The duration of his reign is uncertain, five years are assigned to him by Manetho, while according to the monuments he reigned for 21 years at least, though this may be due to an artificial reckoning. His principal buildings are the pylons in the temple at Karnak. Of military achievements only an expedition against the negroes of the Sudan is mentioned in his rock-hewn temple at Silsileh. He completed the religious reaction against the reformation introduced by Amenophis IV. Harmais, of whom Herodotus has preserved some strange popular tales, is the same person. In other places, however, Manetho gives the name Horus to the heretic King Amenophis IV (qv).

HORUS THE ELDER. See HAROKERIS.

HORVÁTH, hōr'vat, MICHAEL (1809-78) An Hungarian ecclesiastic, statesman, and historian, born at Szentes in the County of Csongrád. He entered the priesthood in 1830, but his liberal ideas led him to abandon temporarily his

priestly calling, and he became, in 1844, professor of the Hungarian language and literature at Vienna. In 1848 he was made Bishop of Csanád and in the following year, upon the declaration of Hungarian independence, became Minister of Public Education and Worship. After the collapse of the revolutionary movement he lived for a time in Paris, Brussels, and Zurich, but returned to his country in 1867. He reentered politics (1876), and until his death was a member of the Lower House of the Diet, voting with the Deák party. His principal works are *History of the Hungarians to 1823* (3d ed., 8 vols., Budapest, 1873), *Twenty-five Years of Hungarian History, 1823-48* (2d ed., ib., 1868), *History of the War of Independence in Hungary, 1848-49* (2d ed., ib., 1872).

HORWICH, hōr'ij A town in Lancashire, England, 4 miles west-northwest of Bolton. Its industries comprise railway works, paper making, cotton manufactures, bleaching works, coal mining, and stone quarrying. It owns its water supply. Pop., 1901, 15,084, 1911, 16,285.

HOSACK, hōs'ak, DAVID (1769-1835) An American physician and scientist, born in New York. He graduated at Princeton in 1789, studied medicine in Philadelphia and afterward in Europe, and was chosen professor of botany in Columbia College in 1795. In 1807 he became professor of materia medica and of midwifery in the College of Physicians and Surgeons, then newly founded, and subsequently of the theory and practice of medicine and of obstetrics and the diseases of women and children. He was the founder of the first botanic garden in the United States. He was connected with Drs. Mott, Macneven, and Francis in organizing the medical department of Rutgers College at New Brunswick, N. J., and in New York City he held various medical positions in asylums and hospitals. He was one of the founders and for 12 years president of the New York Historical Society and was a fellow of the Royal Society of Great Britain. His publications include *Essays on Various Subjects of Medical Science* (1824-30), *System of Practical Nosology* (1829), *Lectures on the Theory and Practice of Medicine*, edited by Henry W. Ducachet (1838).

HOSANNA, hō-zăn'na The cry with which Jesus was greeted at His last entry into Jerusalem, according to Matt. xxi. 9, Mark xi. 9, John xii. 13. It is probably identical with the Hebrew expression *hoshia-na* (save now), occurring in Ps. cxviii. 25, abbreviated to *hosha-na*, as the imperative in Ps. lxxxvi. 2 suggests. This expression occurs as part of the Psalter used at the Feast of Tabernacles. When this word was said, the boughs were waved. Gradually the boughs themselves came to be called "hosannas," and the day on which the hosanna prayer was said seven times came to be called "day of the great hosanna." But in the New Testament passage "hosanna" seems to be used as an acclamation, almost as "hail" in English, and the same applies to *Dadache*, x. 6. If the passage occurred in the original Aramaic gospel, a phrase meaning "Deliver now" (or "Give victory now") "to the son of David" may have been misunderstood. But grave doubts have been expressed by many scholars as to the accuracy of the tradition. As Jesus' entry took place at the Passover and not at the Tabernacle season, there would hardly be any occasion to introduce "hosanna" in the ordinary sense, and there are many difficulties in harmonizing the accounts of

this episode with the general tenor of His teaching and His apparent conception of His ministry. Consult the discussion in Dalman, *Die Worte Jesu*, vol 1 (Leipzig, 1898) id., *Grammatik des jüdisch-palästinischen Aramäisch*, p 249 (2d ed., 1b, 1905), Schmidt, *The Prophet of Nazareth* (2d ed., New York 1907)

HOSE A flexible tube or conduit, used for the flow of liquids or gases, and formed of some fabric, such as cotton or linen, with or without a lining or outer surface of India rubber. It may be also of rubber alone, or of metal spirally wound so as to form a tube. Ordinarily, however, the term "hose" is applied to tubing made of rubber with cotton or linen covering. It is used for a wide range of purposes, from the familiar hose of the lawn and garden and the fire department to the armored hose for conveying compressed air to drills and other mining machinery in the interior of the earth. A few of the purposes for which hose may be employed are given in the following list of varieties, listed in the catalogue of a large American manufacturer: air, air brake, air drill, brewing, car heating, gas, hot water, oil, pneumatic signals, steam, steam drills, tanners, water, wine.

Where pure rubber is used without some such fabric as cotton or linen, the term "tubing" is usually applied, and this is generally confined to the smaller sizes. On the other hand, in addition to being formed of various woven fabrics, the hose may be strengthened by wire, rope, or marline wound or applied by special machinery, to increase its strength, prevent excessive expansion, and resist abrasion, as when used in mines or quarries. Possibly the most important use of hose is for conveying water and especially for fire protection. For this purpose hose made of leather was used until 1839, although it is said that India-rubber hose was brought out in England in 1827. In the year 1859 hose made of cotton and having a rubber lining was shown at a fireman's parade in Manchester, N. H. This was a natural result of Goodyear's discovery of the vulcanizing of rubber in 1844. In Great Britain Charles Macintosh, of Manchester, and Thomas Hancock, of London, were pioneers in a similar branch of manufacture. The original rubber hose consisted of a single coat of solid rubber covered with folds of proved canvas. It was made by weaving cotton yarn into a belt, which was coated with rubber and then turned over a mandrel and its edges riveted with copper. This was the essential method of manufacture until 1877, the cotton being woven on flat looms, but in the year mentioned B. L. Stover, the president of the Eureka Hose Company, devised a circular loom to make a seamless tube of cotton, and since that time this process has been used, especially in the United States. For fire hose the cotton yarn is carefully selected with a staple not less than 1 inch in length and of adequate strength. It is woven to the length and thickness required. There may be several sets of fabrics employed, but all are interwoven or connected by binder threads, so that the cotton tube is essentially homogeneous and strong. The best grades, as for the fire department, have a number of sets of fabrics, termed jackets or plies, but smaller sizes require but two and sometimes merely one. The lining with rubber is performed entirely by machinery. The rubber compound, which should contain 40 per cent of pure fine Para gum, and no injurious substitutes or adulterants for fire hose, is passed through

calender rolls which are adjusted to one-third of the ultimate desired thickness. After the first sheet is rolled the second and third, of similar thickness, are pressed, and the sheets are carried to a table, where they are cut to strips of the width required, and the edges of the tube are lapped and cemented. This forms a lining, which is vulcanized with suitable mineral filler in the usual way. These rubber tubes may be faced or manufactured entirely from a single thickness and finished without a seam; but superiority is claimed for the lap and joint process, as not only can defects in the rubber be detected more readily, but with the three plies defects in one or two may be remedied. This lining tube, previous to being inserted in the walls of the jacket, is cleaned of all foreign substances and attached to a cylinder, which is forced through the cotton tube by power. The ends are then fastened respectively to a steam head and the exhaust head of a steam table, upon which the hose is stretched, and live steam is admitted, inflating the lining, and pressing it against the interior surface of the fabric. At the same time the heat softens an adhesive cement backing on the surface of the lining and attaches the latter to the jacket. The finishing process involves attaching the brass or bronze couplings of the hose and giving a final test, which in extent and severity depends upon the purpose for which it is intended, as hose is made that will stand up to 700 pounds' pressure, while at least 300 pounds must be resisted for fire service.

American fire departments use rubber-lined hose covered with a cotton jacket or with a cotton duck which is rubber-covered. The rubber-lined hose is the more durable and the more flexible and consequently can be handled with greater facility by the firemen, but it has the disadvantage of having to be dried each time that it is used. The rubber-jacketed hose, on the other hand, does not need to be dried, but it has an average life of about five years, as compared with seven years for the cotton-covered hose. Not only is it essential to have adequate strength, but a smooth interior surface, as where this is irregular there may be an extraordinary loss of pressure, amounting to as much as 25 pounds per 100 feet. This loss of pressure in the interior of the hose is a serious consideration in fire fighting. It varies with the nature of the hose and the length of time that it has been in service.

In most fire departments hose of 2½ inches' internal diameter is employed, but in the larger cities 3-inch or 3½-inch hose is available for high pressure or fire-boat service and for long lines, being especially desirable for outside service, as with the same hydrant pressure a 3-inch hose will deliver a stream of water twice as far as a 2½-inch hose. To preserve hose it must receive suitable care, must be tested under pressure at least once a year, and after use, if wet or muddy, must be cleaned and exposed to air in towers or on racks to dry. For this reason hose towers are a feature of most city fire-engine houses, and spare hose is kept stretched out in slanting ventilated racks. It should not be kept in warm rooms, and short bends in hose of any kind should be avoided. When it is stored or stowed in folds, as in most modern hose-wagons or tenders, the folds should be changed from time to time to avoid permanent set. Rubber-lined hose should have water passed through it at

least four times a year to moisten the rubber. Rubber-lined hose is liable to crack if bent while frozen, and there is probably deterioration of the rubber when exposed to intense cold.

Standard specifications for the various kinds of hose for fire protection, both public and private, have been considered and prepared by the National Board of Fire Underwriters, the National Fire Protection Association, the Associated Factory Mutual Fire Insurance Companies, all of whom have prepared bulletins and specifications, copies of which will be furnished on application to these bodies. There is a tendency towards more rigorous as well as uniform specifications on the part of the fire departments of the United States and Canada, and with the use of increasing high pressure a better quality of hose is demanded and is being furnished. Bursting hose is a serious hindrance at a serious fire and has figured in not a few American conflagrations.

It is obvious that means should be provided for joining lengths of hose, and there should be absolute interchangeability of all couplings, not only of a single fire department, but of those of adjoining towns and cities, which may be called upon to aid one another in case of a conflagration. Accordingly in America the National Fire Protection Association has recommended national standard hose couplings and hydrant fittings for public fire service which have been approved and adopted by the more important insurance, fire, water-works, and municipal-engineering associations.

For interior service, especially in dry, warm rooms, as of textile mills or the corridors of office buildings where hose must be hung, as on hose racks, for emergency service, unlined linen hose is recommended, both on the score of economy and of longer life when not used. Furthermore, it will not become stuck together by the ordinary heat of the building and is lighter and more readily used by one man. While linen is injured every time it is wet and is not suitable for lines of more than 50 or 100 feet in length on account of the interior friction, yet, if kept in a dry place, it is considered a reliable safeguard for 20 years or more. Unjacketed cotton rubber-lined hose is recommended for yard hydrants of an ordinary factory, as preferable to the thicker and heavier jacketed hose used by the city fire departments.

A large amount of hose is required in railway operation for the air brake and for steam heating. Air-brake hose is internally wired so as to provide increased strength and must be flexible and durable. In fact, while it is being tested, it is placed in a machine where the swing and kinking motion of a moving train is counterfeited. Hose designed for suction is also wired.

In the United States rubber hose is ordinarily made in lengths of 50 feet, and the sizes are indicated by the internal diameter. In Great Britain 60 feet is not an uncommon length. As rubber hose is vulcanized by the action of heat at a temperature of 250° to 260° F, it should not be used at temperatures in excess of this amount, for the intense heat of the steam is apt to harden the rubber and cause it to lose its life, elasticity, and adhesiveness. For garden or lawn hose the usual size is $\frac{3}{4}$ of an inch internal diameter, as $\frac{1}{2}$ inch presents too much internal friction, while few manufacturers make an intermediate size, which would serve many purposes, 10 to 20 grades of garden hose are

manufactured, and numerous qualities are available for customers. See FIRE PROTECTION.

HOSE, CHARLES (1863-) An English tropical administrator and naturalist, born at Wilham, Hertfordshire. He was educated at Jesus College, Cambridge, and from 1884 to 1907 was in the service of the Rajah of Sarawak, being member of the Supreme Council in 1904-07. He studied the flora and fauna of Sarawak, and it was due to his investigations and suggestions as to the cause of beriberi that Stanton and Fraser in 1909 discovered that the disease was due to polished rice. With McDougall he wrote *The Pagan Tribes of Borneo* (1912), a valuable anthropological work.

HOSEA, hō-zē'a (Heb *Yōshē'a*, deliverance). One of the prophets, whose discourses, forming the Book of Hosea, come first in the group of minor prophets. Of his life we know nothing except what may be inferred from references in the discourses. His father's name is Beeri (Hos 1), and his home is in the Kingdom of Israel. In the first three chapters he uses as an illustration a strange incident in his own life. Following a divine command, he had taken for his wife a woman, Gomer, the daughter of Diblaim, who was a harlot. What is probably meant is that she was a Kedesah, or sacred prostitute, attached to some shrine. He had with her three children, to whom, like Isaiah (qv), he gave symbolical names, Jezreel, Lo-ruhama (no grace), and Lo-Ammi (not my people), indicating his prophetic feeling concerning Israel and possibly also his growing consciousness of her faithlessness to him. She left him and seems to have fallen into the condition of a slave when Hosea found her, purchased her freedom, and brought her to his home. The interpretation of the passage referring to this transaction is not quite certain. At any rate, Hosea took her back, though without resuming marital relations with her. There is no reason to question the reality of this personal experience, or that the prophet derived from his own sorrow a keener horror of his people's faithlessness to Yahwe, but also from his own pity to his erring wife a realization of Yahwe's unchanging love for Israel. According to the heading of the book, his activity extended over the reigns of Uzziah, Jotham, Ahaz, and Hezekiah of Judah (about 777-686 B.C.) and the reign of Jeroboam II of Israel (c. 732-740). This heading is likely to come from some editor of the oracles, and grave doubts have been expressed as to its accuracy. It does not necessarily imply that Hosea's prophetic ministry began before the last decade of the long reigns of Uzziah and Jeroboam II, but if it continued into the reigns of Jotham and Ahaz, it is strange that the last six kings of Israel are not mentioned, and Hezekiah's reign seems to have begun after the fall of the Kingdom of Israel. From internal evidence it may perhaps be inferred that his oracles were uttered between 750 and 734 B.C., when Tiglath-pileser IV attacked the Northern Kingdom. Hosea addresses himself chiefly to Israel, the Northern Kingdom, and the burden of his message is the people's infidelity towards Yahwe as exemplified by their adoption of foreign rites, by political alliances that subjected the people to foreign influences, and by the general neglect of moral standards in public and private life. These conditions were brought about by the energetic political policy inaugurated by the dynasties of Ahab and Jehu, and the prophet fairly exhausts

the vocabulary in his denunciation of this policy and in predicting the dire destruction, not only of the dynasty, but of the people. The book may be divided into two parts. (1) chapters i-iii, detailing his personal experience of marriage to a faithless woman, and the application of the experience to conditions existing in the Northern Kingdom, (2) chapters iv-xiv, in which (a) the evil and licentious features in the Hebrew cult are denounced and the attendant moral degradation of the people, (b) the misrule of the kings, the riotous life of the court, and the fondness for foreign alliances are pictured in vivid colors. Many scholars hold that there are a number of later additions and interpolations to the original text of the discourses. In these supposed additions (1) references are supplied to the Kingdom of Judah, with which it appeared the prophet did not concern himself at all, and (2) the gloomy outlook is modified by holding out the hope that a remnant at least, uncontaminated by the prevailing religious and political conditions, will escape the awful doom and form the nucleus for the reconstitution of the people on the basis of true Yahwe worship and with obedience to Yahwe's laws as the corner stone. In regard to the latter group, however, it should be borne in mind that the prophet's own pity for a faithless wife had manifestly taught him to expect the same of Yahwe in his relations to Israel, though the original expressions of hope may easily have been colored in transmission. Consult the commentaries mentioned in the article MINOR PROPHETS. Cheyne, in the *Cambridge Bible for Schools and Colleges* (Cambridge 1889), Valetton, *Amos and Hosea* (London, 1894), W. R. Smith, *The Prophets of Israel* (ib, 1895), W. R. Harper, "Amos and Hosea," in *The International Critical Commentary* (New York, 1898), G. A. Smith, *True Minor Prophets* (2 vols, ib, 1906-07).

HOSEA BIGLOW. The fictitious signer of a number of Lowell's *Biglow Papers* (q v).

HOSEIN. See HASAN AND HOSEIN.

HOSEMANN, hō'ze-man, ANDR. See OSLANDER.

HO'SIERY (from *hose*, AS, OHG *hosa*, Ger *Hose*, hose, stockings). In its most limited sense this term refers to the manufacture of stockings (hose), but in its more general application it comprises all knitted goods, either made by hand or by machinery. The use of stockings originated in the cold countries of the north of Europe, and probably the first were made of skins and subsequently of cloth, they were also, until a comparatively late period, made all in one piece with the trousers, constituting trunk hose. These garments were separated, and the art of knitting was invented. It is supposed in Scotland, about the commencement of the sixteenth century, for knitting of bonnets and hose is referred to as early as 1550. Knitted stockings found their way to France from Scotland and led to the establishment of a guild of stocking knitters, who chose for their patron saint St. Eustace of Scotland. Queen Elizabeth and her court were the first to wear silk stockings, and a machine for knitting them was invented in 1598 by William Lee, of Woodbridge, Nottinghamshire, which entirely altered the hosiery trade. In 1689 German immigrants of the sect known as Mennonites set up in Germantown, Pa., their stocking frames. By 1790 the stocking industry was established at several towns in Connecticut. In 1822 the stocking in-

dustry was established at Ipswich, Mass., with stocking machinery secretly brought over from England, and in 1825 the first knitting mill was established at Germantown. From this time the hosiery industry spread rapidly and from the manufacture of stockings developed to include underwear and an ever-increasing variety of apparel as demanded by modern conditions and fashions. The hosiery product of the United States was, in 1899, \$27,420,000, and in 1909, \$68,722,000; the number of pairs produced in 1899 was 29,904,000 dozen, and in 1909, 62,825,000 dozen. See KNITTING.

HOSIUS, hō'shi-ūs (c 256-c 358). Bishop of Cordova. He became Bishop about 295 and retained the office till his death about 358. Having suffered persecution under Maximian, he was honored for his steadfast faith. The Emperor Constantine was strongly attached to him and it may be owed his conversion to him. In 324 he sent him to Alexandria to mediate between the Bishop of that city and Arius as well as to settle the dispute concerning the observance of Easter. In the following year the Council of Nicaea was called for the purpose of considering both subjects, and Hosius was one of its presiding officers. At the close of the council he drew up, or, as some say, announced the decree, signed it first, and prevailed on the Emperor to sanction it. He was president of the Council of Sardica, called in 343-344 by Constantius and Constans at the desire of Athanasius. In 355 Constantius requested him to join in condemning Athanasius, but, instead of doing so, Hosius defended him. Having persisted in this course a second and even a third time, he was at the close of the year banished by the Emperor. Two years afterward he was summoned to attend the Council of Sirmium, where worn out with extreme age and hardship, he was prevailed on to sign a document favoring Arianism, yet he steadfastly refused to condemn Athanasius. He was then allowed to return to his home and office. Consult Gams, *Die Kirchengeschichte von Spanien* (Regensburg, 1864), Hipler, *Die Biographien des Stanislaus Hosius* (Braunsberg, 1879), Harnack, *History of Dogma* (Boston, 1894-1900), Gwatkin, *Studies of Arianism* (2d ed., London, 1900), Hefele, *Histoire des conciles* (Paris, 1907).

HOSLEY, HARRY HIBBARD (?-1908). An American naval officer. He graduated from the United States Naval Academy in 1875 and was promoted to lieutenant in 1889, to lieutenant commander in 1899, and to commander in 1904. He will be remembered as commander of the towing expedition which took the dry dock *Deucey* from Chesapeake Bay to the Philippine Islands by the way of the Mediterranean Sea, the Suez Canal, and the Indian Ocean. The expedition started on Dec. 26, 1905, and after traveling 13,080 miles reached its destination at Olongapo July 10, 1906. The feat was regarded as extremely difficult because of the unwieldy nature of the great dry dock, displacing more than 11,000 tons, but although the *Deucey* broke her towing cable six times, she arrived at her destination without injury. Hosley was a supervisor of New York harbor.

HOSMER, hōz'mēr, HARRIET (1830-1908). An American sculptor. She was born in Watertown, Mass., and studied drawing and modeling in Boston and anatomy in the St. Louis Medical College. Her first important instruction in art was received in the studio at Rome of the Eng-

lish sculptor, John Gibson (qv), with whom she worked for seven years. There she modeled her original heads "Daphne" and "Medusa," executed for Samuel Appleton, of Boston. "Beatrice Cenci," in the public library of St. Louis, and "Cenone" (1855), her first full-size figure. Her spirited and original statue of "Puck" was esteemed so successful that 30 copies were ordered, among others by the Prince of Wales and the Duke of Hamilton. Her most ambitious work is a colossal statue of "Zenobia in Chains," completed in 1859. Her bronze statue of Thomas H. Benton is in Lafayette Park, St. Louis. The "Sleeping Faun," exhibited in Paris in 1867, is one of her best works. Its companion is called "A Waking Faun." A fountain in Central Park, New York, and the heroic statue of Queen Isabella of Castile, unveiled in San Francisco in 1894, are by her, as are also the "Queen of Naples" and the "Heroine of Gaeta." She invented several technical processes in connection with her art and, like her master John Gibson (qv), was a "classicist." Nathaniel Hawthorne described her picturesquely in his *Italian Notes* and in his *Marble Faun* alludes to her "Clasped Hands of the Poet Robert Browning and his Wife." For personal anecdotes and letters, consult Carr, *Harriet Hosmer* (New York, 1912).

HOSMER, JAMES KENDALL (1834-). An American author, born in Northfield, Mass., and educated at Harvard. He left the Unitarian church at Deerfield, of which he was pastor, to go to the Civil War as a private soldier and upon his return took a professorship of rhetoric and English in Antioch College. Thence he went to the University of Missouri, taught English and history for two years, and in 1874 was appointed professor of English and German literature at Washington University, St. Louis, a post he retained until his appointment as librarian of the Minneapolis Public Library in 1892. He was elected president of the American Library Association in 1902. His writings include *Color Guard* (1864), *Thinking Bayonet* (1865), *Short History of German Literature* (1878), *Memorial of G. W. Hosmer, D.D.* (1882), *Story of the Jews* (1885), *Life of Samuel Adams*, in the "American Statesmen Series" (1885), *Life of Sir Henry Vane* (1888), *Short History of Anglo-Saxon Freedom* (1890), *How Thankful was Beowulfed* (1894), *Life of Thomas Hutchinson* (1896), *Short History of the Mississippi Valley* (1901), *History of the Louisiana Purchase* (1902), and vols. xx (*The Appeal to Arms*) and xxi (*The Outcome of the Civil War*) of *The American Nation* (1907), published in 2 vols., entitled *The American Civil War* (1913). He edited *The Expedition of Lewis and Clark* (1902), *The Journal of John Winthrop* (1908), and *The Last Leaf* (1912).

HOSPICE, hōs'pīs. See INN.

HOSPIN'IAN, RUDOLF (1547-1626). A Swiss Reformed polemical writer. He was born in the Canton of Zurich. After studying there he went to Marburg and Heidelberg and on his return in 1568 combined the position of preacher with that of school-teacher. From 1576 to 1595 he was head of the famous Karolinschule attached to the Great Minster. Meanwhile he entered the lists as a doughty champion of the Reformed church against Roman Catholics and Lutherans. Bellarmine wrote against him on the side of Rome and Hutten on the side of

Luther. His fellow townsmen highly honored him. In 1588 he was made Archdeacon of the Great Minster and in 1594 pastor of the Fraumunster Church. He died in Zurich, March 11, 1626. His works were collected under the editorship of J. H. Heideffer and published in seven folio volumes (Geneva, 1681). The latest of his writings was *Historia Jesuitica* (1619, trans., *The Jesuits' Manner of Consecrating Persons and Weapons Employed for the Murdering of Kings and Princes by Them Accounted Heretics*, Dublin, 1681).

HOSPITAL (from OF *hōspital*, Fr *hôpital*, from ML *hospitale*, inn, from Lat *hospitālis*, relating to a guest or host, from *hospes*, guest, host). A place used for the shelter and treatment of the sick or wounded, old English usage, also, an asylum for orphans and helpless children or for the aged and infirm. Lepet hospitals were established in early times and were called spitals or *hospitia*.

The term "hospital" is now rarely used for those teaching and custodial institutions that care for foundlings, orphans, and the aged, destitute, etc. These are termed asylums, homes, colleges, and almshouses. A number in England retain the old name, such as Christ's Hospital in London, Heriot's Hospital, and Donaldson's Hospital in Edinburgh, St. Cross Hospital at Winchester, etc. The term "hospital" has come to be restricted to an institution in which the sick are treated, whether such illness be of the brain or of other parts of the body.

At the present time two general classes of hospital relief work are carried on in the large cities of the world. In *dispensaries* patients are treated who are able to be about and have temporary or serious illness, not sufficiently severe to confine them to bed. In *hospitals* patients are treated who must be confined to their beds, for certain times at least. Many dispensaries are associated with teaching institutions and are then termed *clinics*, and the patients who come are in some instances utilized to instruct the students of medicine. The word "infirmary" is a common English term for both dispensaries and hospitals.

Hospitals were founded in very early times. India, Persia, and Arabia had hospitals supported by their kings and rulers before the Christian era. There is good evidence that King Asoka of India in the third century B.C. commanded the establishment of hospitals, and that these hospitals were flourishing in the seventh century A.D. As far back as the earliest period of Greek history the sick are said to have been treated in the temple of Æsculapius at Epidaurus. In the early Jewish period a house for the reception of the sick was called Beth Holem. Such an institution was Beth Saida, mentioned in the New Testament. These hospitals seem to have been wooden huts. In ancient Egypt hospitals were unknown, the sick being tended at home or in temples. Plato says that the Greeks, on the other hand, maintained shelter houses for the sick in various parts of the country, supplied with attendants. The best institutions of the kind in ancient times were undoubtedly in Rome. The inscription upon a tablet discovered near Piacenza, dated in the time of Trajan, shows that the Romans not only possessed such houses, but that they were actually endowed. One of the earliest hospitals on record was probably that founded by Valens in Cæsarea between 370 and 380 A.D.

The advent and spread of Christianity in and after the fourth century gave a great impetus to all forms of public charity, but it was the monastic orders that earliest recognized the Christian necessity of systematic institutional care of the sick, out of the early monastic hospital system as its germ has grown the entire marvelous hospital system of modern times. One of the earliest of recognized hospitals was in France, and the present Hôtel Dieu of Paris is supposed to have had its origin as early as the seventh century. During the Crusades many hospitals were built, and there arose a special class, the *Hospitallers*, or knights whose duty it was to take care of the sick. The present orders of Sisters of Mercy, Sisters of Charity, and allied societies, had a somewhat similar origin. With the establishment of the schools of learning, and more particularly with the development of the study of medicine, many of the hospitals formed departments in the universities, and the university towns developed large and important hospital facilities. Bologna and the Italian towns led the way. Paris and the schools of France followed, and in England and Scotland the hospitals of London and Edinburgh were the great medical schools. Thus, St. Thomas's, of London, was established in 1553, St. Bartholomew's in 1546, where in 1609 Harvey, who discovered the real nature of the circulation of the blood, was physician, and Bethlehem in 1547. American hospitals of the United States were largely founded on English models, although the influence of the French school was not absent in the early history of the United States and Canada. It seems probable that the earliest hospital founded in the United States was the Pennsylvania Hospital, although there were earlier institutions in Canada and Mexico. Efforts were set on foot as early as 1709 to establish a hospital in Philadelphia. In 1730-31 the city almshouse was founded and did medical work, but it was not until 1750-51 that the Pennsylvania Hospital first had its actual birth. Joshua Crosby was the first president of the board of managers, and Benjamin Franklin the first clerk. The New York Hospital was the second hospital of importance. Its charter was granted in 1771. From these early beginnings there has now grown up in America a veritable forest of hospitals. Nearly every city and town has its duly appointed hospitals, and the hospitals of the United States are now acknowledged the most handsomely and thoroughly equipped in the world, they serve as models for European architects.

In most of the larger cities of the United States there are two or more hospitals that are under the control of the city government and used exclusively for the city poor. Such are the Johns Hopkins Hospital in Baltimore, the Philadelphia Hospital in Philadelphia, Bellevue and allied hospitals in New York, Massachusetts General and Boston City in Boston, Cook County Hospital in Chicago, etc. In addition to these municipal hospitals there are numerous institutions founded by private gift and by sectarian societies, such as the New York Hospital, Roosevelt, Presbyterian, St. Luke's, German, French, Mount Sinai, St. Vincent's, St. Mark's, Flower, etc., hospitals in New York, and hundreds of others in other cities. Further, there are numberless special hospitals for the treatment of separate diseases: hospitals for diseases of the eye, the ear, the nose, the throat, cancer

hospitals, maternity hospitals, hospitals for diseases of women, for diseases of the skin, and for all the various specialties. The Rockefeller Institute for Medical Research in New York City maintains a hospital which is unique in receiving only patients who, while receiving the best and most scientific medical treatment, lend themselves to further research into the various problems under investigation at the time, so that a thorough test of new remedies can be made.

The details of hospital management cannot be entered into here. The medical side of the work is usually fashioned on well-established lines. In the larger hospitals the patients are immediately cared for by the nurses (nurses are paid a small salary unless they are sisters of some religious denomination) these are under the orders, so far as the treatment is concerned of the *internes*, or young graduates in medicine who have gained this privilege by competitive examinations, and who serve in graded positions for periods of time of from one to three years. These generally reside in the hospital, receive no salary save their living, and are constantly in attendance. Furthermore, the *internes* are under the supervision of the *attending* or *visiting physicians*, who are practitioners in the city, chosen by the governing boards of the hospitals for their ability or for other reasons. These visit the hospitals at specified times and outline the plans of treatment for the patients. Their time and services are usually given gratis, always so in the municipal hospitals. Many hospitals have consulting physicians and surgeons who may be called in to diagnose rare conditions, but such appointments are usually rewards for work done in the other grades and carry with them honor and position. Furthermore, most large hospitals, especially those where teaching is carried on in connection with the care of the sick, maintain well-equipped pathological departments where constant study is made by scientific methods of specimens and material to aid in determining the disease, this being intrusted often to a group of specialists who are not concerned with methods of treatment.

In 1905 a hospital boat, with fully equipped wards, was devised and adopted by the New York City Health Department for transportation of contagious cases to the island isolation hospitals.

Chiefly within the past century a system of hospitals specially designed for the care and treatment of the insane has been established all over the world. In the United States these institutions are supported by the several States. The State of New York has 16 such hospitals, each accommodating from a few hundred to a few thousand patients. The physicians who serve in these hospitals are specialists in mental diseases and receive salaries which vary with the length of service. Very recently acute psychopathic hospitals have been established in some of the large cities in connection with the principal general hospitals. In these institutions patients afflicted with mild and curable forms of mental trouble receive treatment without being regularly committed to an insane asylum. Such are the insane pavilions in Bellevue and Kings County hospitals in New York.

History and Architecture. There are no data available on the design and arrangement of the earlier monastic hospitals, but with the remarkable development of monastic architec-

ture (see MONASTERY) in the eleventh and twelfth centuries, the hospital was given an important place in the architectural scheme, and its design was further developed in the Gothic period. Several of these mediæval hospitals are still extant, wholly or in part. The most notable is that at Ourscamp, not far from Compiègne, in France. The hospital of this type was a vast and lofty hall, usually vaulted upon one or two rows of columns, and provided with latrines and other accessories. The building was isolated and, being spacious, lofty, and well lighted, served admirably the simple requirements of the time. In closely built cities, however, the tendency was to build in several stories and around inclosed courts, as in the vast Ospedale Maggiore at Milan, which, dating from the sixteenth and seventeenth centuries, has nine courts and accommodates 3500 patients. The result was loss of light and ventilation, overcrowding, and progressively increasing danger from accumulated deposits of noxious germs.

In 1778 the French Academy of Sciences first among scientific bodies promulgated principles and rules for hospital design, and during the nineteenth century, especially after the Crimean War (1854-56), with its frightful mortality among the sick and wounded in the great barrack hospitals at Scutari and Kuleli (Constantinople), medical and surgical science occupied itself increasingly with the problem of hospital design and construction. The vice of inclosed courts, low ceilings, and inadequate sunshine and air was recognized, and the pavilion type was recommended for all permanent hospitals, the wards being housed in wings of not over three stories, exposed to the light and air on three sides, and connected at one end by a continuous structure containing the administrative and other accessories.

The great Hôtel Dieu at Paris, built in 1854, very imperfectly embodied these ideas. They are realized to perfection in such modern hospitals in cities as the Johns Hopkins at Baltimore, the Mount Sinai at New York, the New King's College Hospital at London, and most modern examples.

The same principles have led to the isolation of many wings or buildings in large complex hospitals, especially those for contagious and infectious diseases. Following the American Civil War it became a common practice to provide, where the space permitted, small isolated, inexpensive, and temporary buildings for such cases, to be burned or destroyed after a few years' service and replaced by similar pavilions, and this practice is still followed in some places. But the tremendous scientific advance which came with the discovery of the agency of germs—microbes and bacteria—in the causation and spread of disease, and with the development of aseptic surgery and of the efficient use of antiseptics, brought about a revolution in the details of hospital construction and put an end, so far as new hospitals are concerned, to the old-time scourge of hospital infection, which in the Scutari Hospital raised the mortality to 42 per cent of all patients.

In all strictly modern hospitals not only is artificial ventilation added to natural ventilation and carefully regulated artificial heat provided in addition to abundant sunshine, but floors, walls, and ceilings are made of the most impervious materials available, moldings, cracks, and projections of all sorts avoided, all

the corners and angles of floors, walls, and ceilings rounded to facilitate cleansing and to prevent the lodgment of dust, and every means employed to prevent secondary infection. Hospitals for the tuberculous are preferably built in an open or wooded country where a dry soil and atmosphere prevail and are arranged to provide for sleeping as far as possible in the open air, in tents or in rooms or porches broadly open to the outside atmosphere.

In general, a modern hospital in a large community comprises many distinct services. The administration building contains offices, examination room, visitors' parlors, chapel, pharmacy, refectory, stores, and various other functions serving the whole institution. The wards, housed in wings or pavilions, in one, two, or three stories, are divided between the medical and the surgical services and comprise both public wards, each with many beds in one large room, and private wards and rooms for one patient each. Adjoining the wards are service rooms (diet kitchens, dining rooms, toilets, baths, nurses' room, etc.). The operating room in the surgical section is sometimes isolated, except for connecting passages, sometimes in a surgical wing on the top floor, with skylight and side windows, etherizing, sterilizing, and recovery rooms. Nurses' living quarters, recreation rooms, a laundry, power house, mortuary house, sun parlors, and various other accommodations are housed variously—sometimes in separate buildings, sometimes in portions or wings of the central building. The equipment for heating, lighting, and ventilating, for baths, toilets, and medical and surgical functions of all kinds, is of the most elaborate and costly description in hospitals of the first class, and there is no kind of building or group of buildings upon which more care and pains and expense are, or should be, lavished than upon hospitals, or which is more complex and exigent in the problems it imposes upon the architect.

Military Hospitals. This term is descriptive, but broadly inclusive in its application to institutions for the care of sick and wounded of military forces. The history of military hospitals is the story of the progress of the healing art and the development of the sanitary departments of armies. As in all civil communities there have always been individuals who have ministered to the ills of the body through methods in which spiritual and material agents were confused, so fighting men have always been accompanied by medicine men of some sort, but in the earlier days they were not a part of the organizations of the armies. In all of the progressive armies of the world the personnel of sanitary departments has always kept pace with the progress of civil medical practice.

Until the thirteenth century, in Europe, the practice of surgery was in the hands of the monks, and when this was prohibited by papal decree it fell into the hands of the barber-surgeons, who for centuries after, under the German name of *Feldscherer* (field barbers)—a name still surviving as "*felcher*" in the Russian army medical service—were almost the only medical attendants with fighting units.

The first organized medical service in the German army was established in the sixteenth century, and from that day to this its progress has been steady and consistent, with a scientific attempt to add the experience of each successive war to its system.

The first attempt of the French to organize a medical service was made in the fifteenth century by the Duke of Burgundy, before this time the wounded were left to find their way to monasteries or to fall into the hands of the chailatans who accompanied the army.

Army commanders have always complained that their losses from disease and wounds weakened their military strength, but all the advance in sanitary measures that has ever been accepted has been forced by the demands of the medical service, supported by public opinion. The French military surgeons endured a system of farming out their hospitals under contract until 1747, and their sanitary service was subordinate to their commissary department until 1780. Outbursts of economy in administration at times caused a return to old systems, but the general progress has been such that the French and German armies have developed the principles of medical service organization which all other armies have since followed. Military disaster is always attended by sanitary failure, and the efficiency of medical organizations can only be tested by actual warfare, which is generally followed by sanitary advance, as, e.g., the reorganization of the medical services of the American and British armies after the Spanish-American and Boer wars.

The two widely different classes of military hospitals are those for peace and those for war, as the one is permanent and the other mobile.

Permanent Hospitals—These hospitals receive soldiers who are living in garrison rather than in camp, and the service to the patients does not differ from that of civil hospitals, although the management and administration are technically adapted to general army methods. The executive and professional functions are exercised by a commanding officer who holds military control over his patients, and all records are kept so as to exhibit the relation of the patient to the government and the responsibility of the government to the patient.

The two classes of permanent hospitals are (1) *post or garrison hospitals*, which are under the direct control of the local commander as a part of his command, and (2) *general hospitals*, which, regardless of their geographical location, are not under the command of territorial commanders but are under the direct control of the War Office through the surgeon-general of the army.

Post hospitals vary in size with the military population, which is called the garrison. In the United States army the bed capacity is estimated at 4 to 5 per cent of the garrison, depending upon the climatic conditions of the locality, but this ratio does not obtain in European armies, as their civil hospitals are used to some extent for military purposes, while in the United States there is no relation between the civil and military institutions. A post hospital may be larger and more important clinically than a general hospital. In the smaller post hospitals no female nurses are employed, as only soldiers of the Hospital Corps care for patients. Nurses of the Army Nurse Corps, who are always attached to general hospitals, may be detailed by the surgeon-general for duty in any post hospital where their services may be required. A woman may be employed in any post or general hospital, as a hospital matron, for the purpose of washing and

mending hospital linen, this arrangement is found expedient only in the smaller and especially the more isolated posts.

In the United States there are two ordinary general hospitals which care for patients from the army who need extended treatment or who are up for final review as to disposition on account of physical disability: one is the Walter Reed General Hospital, Washington, and the other the Letterman General Hospital, San Francisco. There are also two special general hospitals for the treatment of special diseases, one is the Fort Bayard General Hospital at Fort Bayard, N. Mex., and the other the Army and Navy General Hospital at Hot Springs, Ark.

The Fort Bayard General Hospital has been established on the site of an old army post, where climatic conditions have been found favorable for the treatment of officers and enlisted men of the army suffering from pulmonary and laryngeal tuberculosis. Other surgical conditions requiring operation may be admitted by the Secretary of War.

The Army and Navy General Hospital is devoted to the treatment of such diseases as the waters of Hot Springs have an established reputation in benefiting. It is administered by the surgeon-general of the army with a medical officer of the army in command, but naval medical officers may be detailed as assistants. Army regulations formerly denied admission to venereal cases, but this proscription was removed in 1910. It is supplied with extensive hydrotherapeutic equipment designed to give that sort of treatment known as a "cure" at Carlsbad or Aix-la-Chapelle. Admission to this hospital is restricted to officers and enlisted men of the regular and volunteer army and navy on active, retired, or discharged status; officers of the revenue cutter service, the public health service, and cadets from the military and naval academies.

In the armies of other countries there are the same two classes of permanent hospitals, but owing to the economical indications of large standing armies and the location of their barracks in or near large cities, their garrison hospitals are frequently a part of the civil hospitals, which are usually institutions of the state. The larger general military hospitals in Europe are usually associated with the education and training of army medical officers, e.g., Netley Hospital in England, Val-de-Grace in France, and the Charité Hospital in Berlin.

Mobile Hospitals—The hospitals of real and vital importance to an army's sanitary service are the mobile hospitals, which are a part of the field organization of the army. Permanent hospitals are only associated with the preparation for war, and their management is simple and formal compared with that of mobile hospitals, which must meet widely varying conditions always in an informal clinical way and are never able to provide the formal service of a peace hospital. "Field hospital" is a term used in the United States army, and similar terms are used in almost all other armies, to designate a particular mobile sanitary unit, as, e.g., the *hopital de campagne* of the French, the *feld-lazaret* of the Germans, and the *feldspital* of the Austrians.

Ambrose Paré, who in the seventeenth century taught the new doctrine that gunshot wounds were neither poisons nor burns, and who laid down what may be considered in this day ra-

tional rules for the treatment of wounds, made the first effort to establish a mobile field hospital, which first achieved fame in the battle of Dettigen in 1743, when the wounded of the French army were systematically evacuated by the Main and the Rhine into Alsace. Larrey, in Napoleon's Italian campaign in 1797, organized the first of flying hospitals, consisting of 1 staff surgeon, 2 assistant and 12 undersurgeons, 2 administration officers, 3 noncommissioned officers, 1 carrier of dressing materials, and 12 sick attendants, all mounted, 6 noncommissioned officers, 1 mechanic, and 25 sick attendants on foot. The transportation consisted of 4 heavy wagons, 4 light four-horse ambulance wagons for four recumbent patients, 8 drawn by two horses for two recumbent patients, and pack animals for mountain service.

This was the parent of the organized mobile units of all armies, and except for a few numerical differences and a somewhat scant equipment it might be taken as a combined field hospital and ambulance of the United States army to-day.

Frederick the Great in 1744 imported from France barber-surgeons to act as operators and instructors in his own army, but he thought they were so expensive that he sent them back after 28 years. Goercke (1750-1822) was to the German medical service what Larrey and Percy were to the French, and he organized the first German field hospitals, although they failed in mobility. Sometime later, and after the battle of Jena (1806), there were 18,000 Germans wounded with no field hospital to care for them, but in 1809 an efficient mobile hospital service was organized which ever since has been consistently improved. With the 20,000 Prussian troops forming part of Napoleon's Grand Army in 1812, there were three flying hospitals of 200 beds each and an evacuation hospital of 1800 beds, which is a proportion of sanitary troops comparing favorably with those accompanying a division of the United States army of a strength of about 20,000. As an example of sanitary progress, it may be noted that in the German army the carrying of first-aid packets was made universal throughout the army in 1869.

In the United States army the attempts at organization of field mobile units have been fitful and with varying success. With all the experience of the past centuries in the organization of field sanitary units the Federal army at the beginning of the Civil War had no field medical service, except the regimental aid. Surgeon Jonathan Letterman of the regular army, who became medical director of the Army of the Potomac in 1862, first organized field hospitals and ambulance companies, after the surgeon-general had protested against the neglect of wounded due to the utter lack of field sanitary units, and General Halleck had disapproved the plan of organization. An effective and efficient organization was then established, but the United States army was again as wholly lacking in 1898. Mobile field sanitary units were next provided as a part of the organization of the army by an Act of Congress in 1903, and since that time efficient units have been provided.

The mobile medical units of the United States army may be taken as an illustration, as they are adopted from the medical services of the Germans and French.

1. *Regimental infirmary*, one to each regi-

ment, made up of the regimental sanitary detachment of 4 medical officers and 24 Hospital Corps men, with special equipment carried by 1 wagon and 1 pack mule, furnishes the first aid in battle.

2. *Field hospital*, three to each division (about 20,000 men), provides 200 beds and receives the casualties at the regimental aid stations. The *personnel* is 5 medical officers (1 major commanding), 9 noncommissioned officers, and 48 privates. The equipment, including tentage and 3 days' rations and forage, weighs 20,000 pounds and is hauled in 8 four-horse wagons.

3. *Ambulance company*, three to each division, provides the litter bearers, works in conjunction with a field hospital, and transports the casualties from the regimental aid when possible and from the dressing stations to the field hospital. There are 12 four-horse ambulances, 3 four-horse wagons, and 4 pack mules. The *personnel* is 5 medical officers (captain commanding), 9 noncommissioned officers, and 70 privates.

4. *Transport column*, two to each division, evacuates wounded from field hospitals to evacuation hospitals. It consists of 4 medical officers, 20 noncommissioned officers, and 64 privates. The ambulances and equipment are the same as for an ambulance company, except the pack mules. Supply wagons returning to the rear are also used when necessary.

5. *Evacuation hospitals*, two to each division, are movable but not mobile, and are located indefinitely along lines of communication and receive the wounded from field hospitals, which latter must be free to move with the division. The capacity is 300-400 beds, with 14 medical officers (lieutenant colonel commanding), 24 noncommissioned officers, and 130 privates.

6. *Base hospitals*, one to each division, provide 500 beds, with an organization somewhat larger than that of the evacuation hospital. No transportation is provided, and, while sufficient tentage is furnished, it is expected that permanent buildings will be occupied whenever they are available.

The combined service of these units provides for the patient's care and transport from where he falls in battle to the base of operations, whence he is conveyed to home territory—to a general military or a civil institution.

Hospital ships are not provided for in the United States army, except that their *personnel*, uses, and method of operation are mentioned in the Medical Department regulations. No arrangements are made for the purchase or conversion of a merchant vessel to a hospital ship, and the matter of supply and equipment must be left until the emergency arises which requires a hospital ship. In other countries hospital ships are specially constructed, and, if not actually in service as such, they are operated as merchant vessels under subsidy, with their equipment and supplies in some port to which the ship at any time can be ordered, to be placed in commission as a hospital ship. See HOSPITAL SHIP.

Hospital trains have not been organized in the United States army, although sets of apparatus are in storage by which empty cars can be equipped to suspend 500 field litters, which will be used as beds. Foreign armies have developed this unit in great detail, and the French army may be taken as an example of the most efficient organization. These are of three classes: (1) *permanent hospital trains*;

(2) *improvised hospital trains* (3) *improvised hospital trains for carrying patients in ordinary passenger cars* For the permanent hospital trains two great railroad systems of France have cars of special construction, in regular service, for which is provided special equipment to be put in place when the cars are taken into hospital service. The material is held in mobilization stores and is sent to the railroad company within five days of the date of the requisition order, and the railroad authorities are responsible for completing the preparation of the train 15 days after receipt of requisition. Each train consists of 16 cars for 8 patients each, 1 car for officers, 1 car for ward orderlies, 1 for kitchen, 1 for pantry, 1 for operating room, dispensary, and linen, 1 for provisions, and 1 for soiled linen and fuel, total, 23 cars. Four spare cars must be kept in reserve in the Paris depot for replacement. The personnel of this train is 2 medical officers, 1 pharmacist, 1 quartermaster, 1 military clerk, and 27 non-commissioned officers and men.

Improvised hospital trains, to carry 306 recumbent patients, are made up of freight cars fitted with special apparatus for suspending litters, and the preparation of one of these trains is carried out according to a carefully timed plan in seven hours.

In general, it may be said that the efficiency of all units organized for the succor of wounded and sick in time of war is based on the same principles that are involved in the efficiency of all combat units, viz., the assembling of proper equipment, the distribution of necessary supplies, and the training of sufficient personnel in times of peace. See *HYGIENE, Military Hygiene*.

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HOSPITAL CORPS, UNITED STATES In the United States recruits are enlisted for the Hospital Corps and permanently attached to the Medical Department, and in time of war perform the necessary field hospital and ambulance service under such officers of the Medical Department and assistants as may be detailed for that duty. They are not required to perform any military duties other than those pertaining to their corps, receiving instruction in such drills, both foot and mounted, as are necessary for their efficiency. Their field equipment is like that of other enlisted men (except that they have no arms or ammunition), with the addition of a large Hospital Corps knife, and an emergency medical pouch or case. Arms are issued only by the authority of the commanding officer when it is probable that rights under the Geneva Convention will not be recognized. At every permanent military post there is at least one noncommissioned officer of the Hospital Corps and an additional one for every additional four privates of the corps. Special in-

structions in the duties of litter bearer and the methods of rendering first aid to the sick and wounded are given to all enlisted men of the signal corps and of the line of the army by their company officers, for at least 12 hours in each calendar year, post surgeons under the direction of post commanders being responsible for the professional instruction of the company officers.

In field service troops are accompanied by detachments of the Hospital Corps, each medical officer on the march being attended by a mounted private of the Hospital Corps. For the regulations of the *sanitary service* in the field, including the use of the first-aid packet, regimental aid station, dressing stations, ambulance companies, field hospital companies, evacuation points, station for the slightly wounded, the sanitary train, etc., consult *Field Service Regulations, United States Army* (Washington, 1914).

HOSPITALERS (OF *hospitalier*, from ML. *hospitalarius*, from *hospitale*, hospital, inn from Lat. *hospitālis*, relating to a guest, from *hospes*, guest). Charitable brotherhoods, founded at various times and in different countries, for the care of the sick in hospitals. The vow to devote one's self to this work of mercy is usually superadded to the ordinary vows of poverty, chastity, and obedience, commanded by St. Augustine. One of the earliest recorded instances of such a brotherhood is the Order of the Madonna della Scala in Italy in the ninth century. The Knights of St. John of Jerusalem (qv), as also the Teutonic Knights (qv), were originally Hospitalers. There are many other local institutes or congregations having various names and living under various rules. The sisterhoods are now much commoner than the brotherhoods, over 100 are known to be in existence.

HOSPITAL SHIP A ship designed to take care of the sick and wounded either as a floating hospital or as a transport hospital. The second Geneva Convention in 1868 provided that hospital ships, merchantmen (i.e., unarmed ships not used for any military or naval purpose), having wounded on board, and boats picking up wounded or wrecked men, shall be neutral. They are required to fly the Red Cross flag, and their men must wear the Red Cross armband. Government hospital ships are required to be painted white with a broad longitudinal green stripe on each side extending from bow to stern, hospital ships belonging to aid societies to be similarly painted, but the stripe is to be red. Both varieties of ships must fly the Red Cross flag as well as their national ensign, and no arms of any sort are to be allowed on board. Any evidence amounting to presumption that the enemy is violating the rules of the convention and using the ships for improper purposes constitutes sufficient ground for refusing the further granting of immunity until the contrary is proved. The hospital ship *Solace* of the United States navy accompanies the fleet even in times of peace to take care of the serious cases of illness or injury. See *HOSPITAL, Hospital Ships*.

HOSPITAL SUNDAY In the United States, the last Sunday of December, in England, the Sunday nearest June 15, on which days the collections in the churches are devoted to the support of hospitals. The custom has been generally adopted since 1873.

HOSPITAL TRAINS See **HOSPITAL****HOSPODAR** (Upper Sorbian, master, lord)

A title formerly given to the governors of Moldavia and Wallachia. Hospodar (*gospodar, gospod, gospodin*, in the various Slav languages) means simply 'master'. The hospodar held his power at the pleasure of the Sultan, who made a practice of farming out the office to the highest bidder. The incumbent held his office for a short period or else secured reappointment by repeated gifts. The Lithuanian princes were likewise called hospodars, and the Polish kings, down to the time of Sobieski, assumed that title in their diplomatic negotiations with Russia. *Gosudar* (ruler, monarch) is even now one of the titles of the Emperor of Russia. In Little Russia hospodar is the title for the head of a family.

HOSS, ELIJAH EMBREE (1849-) An American Methodist Episcopal bishop and educator, born in Washington Co., Tenn. He graduated from Emory and Henry College (Virginia) in 1869 and entered the ministry of the Methodist Episcopal Church South in 1870. He was president and professor in Martha Washington College from 1876 to 1881, vice president and president of his alma mater (1881-85), for five years professor of ecclesiastical history in Vanderbilt University, and from 1890 to 1902 editor of the *Christian Advocate*, published at Nashville, Tenn. In 1902 he was elected Bishop of his church.

HOST A term used in pathology, especially plant pathology, to designate the living plant or animal upon which a parasite is living. For example, in the case of wheat rust the wheat is the host and the rust is the parasite. In the case of disease following the attack of a parasite it is the host that is diseased, while the parasite induces the disease.

HOST See **LORD'S SUPPER**

HOSTAGE (OF *hostage, ostage, Fr. otage*, It. *ostaggio*, from Lat. *obsidatus*, state of being a hostage, from *obes*, OLat. *opes*, hostage, from *obsidere*, to remain, from *ob*, at + *sidere*, to sit, influenced in popular etymology by Lat. *hostis*). A person or thing given in pledge for the performance of conditions. When a town capitulates, victors and vanquished usually give into the custody, one of the other, several officers, as pledges that each party will duly carry out the terms stipulated. When the terms are fulfilled, the hostages are exchanged, but if the terms be evaded, the opposite side holds the right to put to death or otherwise punish the hostages in its possession.

HOSTEL See **HALL**

HOSTILITY, ACTS OF See **ACTS OF HOSTILITY**

HOSTILITUS, TULLUS A semilegendary king of Rome, grandson of Hostus Hostilius, the champion of Rome in the first war with the Sabines, he succeeded Numa Pompilius on the throne of Rome (670 B.C., according to the common chronology). Consult Livy, I, 22-31.

HOSTIUS, A Roman epic poet of the second century B.C., author of metrical annals after the manner of Ennius (q.v.), and *Bellum Histricum*, in 7 books, a poem on the Istrian War of 129 B.C., in which the consul Gaius Sempronius Tuditanus was victorious. Fragments of the latter work, quoted by Macrobius (*Saturnalia*, vi, 3 5, vi, 5 8) and Servius (*Ad Æn.*, xii, 121), are printed in Baehrens, *Fragmenta Poetarum Romanorum* (1886). Some authorities think he

is the *doctus aius* alluded to by Propertius (iii 20 8), some ancient authorities declare that the real name of Cynthia, the mistress of Propertius (q.v.), was Hostia.

HOSTRUP, hös'trup, JENS CHRISTIAN (1818-92) A Danish poet and dramatist, born at Copenhagen. His first comedy, *Gyenboerne* (The Neighbors, 1843, published in 1847), was acted by his fellow students before he left the university. It was played afterward at the Royal Theatre and remains a favorite piece. Among his other plays, composed under the pseudonym of Kristrup, are *Intingerne* (1848), *En Spurv i Tranedands* (1846), *Eientyr paa Fodreisen* (1850), *Soldaterlojer* (1849), *En Nat mellem Fjeldene* (1852, music by Emil Hartmann), *Mester og Løvling* (1852). From 1855, when he took orders, to 1881, he had charge of a parish. His *Folkelige Foredrag* (Popular Lectures) appeared in 1882. A volume of his poems, *Sange og Digte*, appeared in 1884, and his drama, *Eva*, in 1881. After this he wrote little but what was demanded by his parochial work. The last years of his life were spent at Copenhagen. His popularity is largely due to the national character of his many plays, his humor without vulgarity, and the vivacity of his dialogue. His poems were published in six volumes (1852-56) and a fifth edition of his comedies in 1888-89. Consult his *Erindringer fra min Barndom og Ungdom* (Copenhagen, 1891) and *Senere Livs-erindringer* (ib., 1893), and Klint, *Jens Christian Hostrup* (ib., 1893).

HOT-AIR ENGINE An engine in which the pressure acting on the piston is produced by increasing the temperature of air through the application to it of heat by transfer through a separating metal wall. This definition distinguishes the hot-air engine from the compressed-air engine (see **COMPRESSED-AIR ENGINE**) on one hand and the internal-combustion engine (see **GAS ENGINE** and **INTERNAL-COMBUSTION ENGINE**) on the other hand. The action of hot-air engines, like that of all other heat engines, consists in admitting the air at a high temperature and pressure and by allowing it to perform work on the piston reducing its pressure and temperature, after which it is either exhausted into the atmosphere and a fresh supply is introduced or else it is cooled and again heated for a repetition of the former process. In their principal working parts hot-air engines are very similar to ordinary steam engines. The heated air is introduced into a cylinder in which works a tightly fitted piston, which is thus compelled to move up and down and transfer its motion to a revolving shaft by means of piston and connecting rods and the other usual mechanisms of steam engines. (See **STEAM ENGINE**.) Hot-air engines are of several types, which may be described and explained as follows. Closed-cycle engines are those which operate continuously with the same mass or weight of air, only taking in a fresh charge to replace leakage or to increase the mass in use. Open-cycle engines are those in which at each stroke a new charge is drawn in from the atmosphere and after being heated and expanded is exhausted again into the atmosphere. Regenerative and nonregenerative engines are those which respectively use or do not use a regenerator to absorb the heat of the exhaust air and to restore it to the incoming cooler air. Finally, closed-cycle engines may be divided into two subclasses, which differ by having the temperature change take place in

the air at constant pressure or at constant volume. Each of these types is identified with the name of some designer or engineer. Hot-air engines have been designed in great numbers, but the limited extent to which they have been

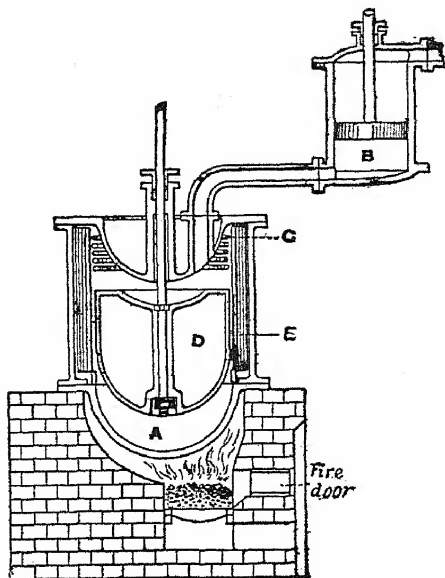


FIG. 1. STIRLING HOT-AIR ENGINE.

used makes most of them but little more than names.

The hot-air engine, as defined at the beginning of this article, seems to have been invented by the Rev. Robert Stirling, an Englishman, in 1816. His first successful engine was built in 1827, and one afterward was used in a foundry in Dundee, Scotland, developing 20-brake horse power on the consumption of 50 pounds of coal per hour. In this engine, shown diagrammatically in Fig. 1, the same volume of air was alternately heated and cooled, producing a variation of pressure which actuated a working piston. The heating and cooling were effected by changing the air by means of a plunger, *D*, from end to end of a cylinder, *A*, one end of which was kept hot by a fire and the other cool by a coil of water pipe, *C*. On its way from end to end the air passed through a passage partly filled with thin plates of metal, *E*, which alternately absorbed the heat from the air and gave it back on the return. This was the first application of the economizer or regenerator, and its invention is said to be due to James Stirling, a civil engineer. This engine failed through the giving out of the heaters, which required to be kept red-hot. In 1844 Franchot, a Frenchman, patented an arrangement of the Stirling engine with large and efficient heating and cooling surfaces. Further attempts at improvement were made by Rankine and Napier, and by Professor Jenkin in England, and also by Lauberau in France. The Stirling engine belongs to the type of hot-air engines with temperature changes at constant volumes. Another hot-air engine which has much the same classic and historical interest as the Stirling engine is that invented by John Ericsson (q.v.). The engines of Ericsson differed from the Stirling engine in that they drew their supply of air

from the atmosphere at each stroke, heated it, allowed it to expand while doing work, then exhausted it again into the external air; they belonged to the type of hot-air engine with temperature changes at constant pressure. The first engine was installed in the ship *Ericsson* in 1852; but the idea dates from 1833, and it enjoys the distinction of having been built on the largest scale and of having made the most noted failure of all hot-air engines. To Ericsson is to be credited also the term "caloric engine," which he applied as a sort of trade name to his invention. Briefly described, Ericsson's first engine was designed for a 2200-ton seagoing ship; it was intended for 600 horse power, but actually ran at about 300 horse power. There were four cylinders, each 14 feet in diameter and having 6-foot stroke, and the engine ran at nine revolutions per minute. As stated above, the engine proved a failure after several attempts had been made to remedy its faults. First the 14-foot cylinders were removed and replaced by others, which also failed; and finally the engine was replaced entirely by a steam engine. Afterward Ericsson made another attempt to drive a ship by an air engine. The *Primera* was built and fitted with horizontal engines drawing their supply from and exhausting into an artificial atmosphere of high pressure. As in the former attempt, however, the heating surface proved inadequate, and the available pressure was too small to give much power, so that again steam was substituted after a short trial. Economizers were employed with both of his large engines, but in the small engines, to the design of which Ericsson turned his attention after the failure of his large motors, the economizer was abandoned. Ericsson's first design for a small motor was brought

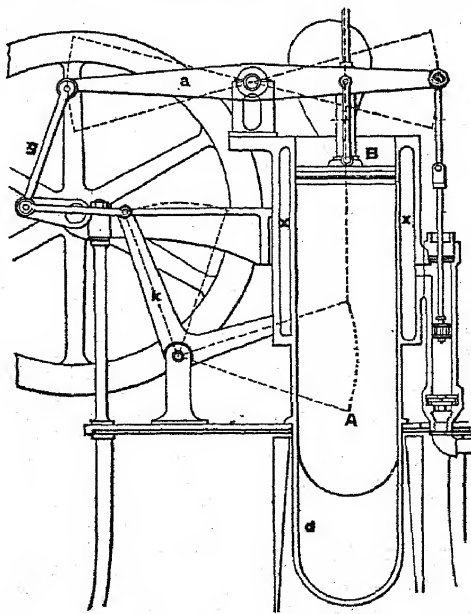


FIG. 2. ERICSSON CALORIC ENGINE.

out in 1860, and in 1880 the latest form for pumping purposes was produced. Fig. 2 shows this type of engine. The fire of coal or gas is below the cylinder *d*, which is water-jacketed at the upper end, *x x*. In tank pumping en-

gines the pumped water circulates through the water jacket. At *A* is the hollow displacing piston, and *B* is the working piston proper. The displacer is coupled to the bell crank *h*, and so to the crank *e* to which the beam *a* is linked directly by *g*. These engines do not use less fuel than steam engines of similar size, but as they require no water or licensed engineer, they have come into considerable use.

The Stirling engine and the Ericsson engine between themselves embodied all the characteristic features of the several types of hot-air engines defined above. The Ericsson engine is an open-cycle, nonregenerating engine, with temperature changes at constant pressure, the Stirling engine was a closed-cycle, regenerating engine, with temperature changes at constant volume. The hot-air engines produced by other inventors of this kind of prime motor have resembled sometimes the Ericsson engine and sometimes the Stirling engine, but have had the details of operation worked out in different ways. Two of these only need be mentioned for the purpose of illustration. The Wilcox engine, of which large numbers were made about 1860 to 1865, was, like the Ericsson ship engine, an open-cycle, regenerative engine, with temperature changes at constant pressure. Its distinctive characteristic was a peculiar supply cylinder fitted with a piston operated from the main shaft. This supply cylinder took in the atmospheric air and passed it through the regenerator to the operating cylinder, where it was heated and expanded to perform its work, after which it was exhausted through the regenerator into the external air. The Merrill engine, one of which of 10 horse power was used for some years previous to 1885 to run a factory at Winchendon, Mass., worked on the same principle as the Stirling engine, i. e., it used the same volume of air over and over. It had two working cylinders, each of which was double-acting (see STEAM ENGINE), and two reverser plungers, which effected the transfer of the air between the heating and cooling devices.

Mention was made at the beginning of this article of hot-air engines employing previously compressed air. These are commonly known as compression engines. In them a constant quantity of air is constantly changed in volume, being compressed while cold and expanded while hot. There are usually two cylinders—one cold and kept cold by a water jacket or other means, and the other hot and kept heated by external means. The piston in the hot cylinder is generally timed from one-sixth to one-quarter revolution in advance of that in the cold cylinder, whereby the air is first changed into the cold cylinder, sometimes through a regenerator, then compressed therein, then changed to the hot cylinder back through the regenerator, taking up again the stored heat, and finally expanded in the hot cylinder. The first engine of this kind seems to have been invented by Charles Louis Felix Franchot, a Frenchman, in 1853, and it is deserving of brief mention for the clear manner in which it illustrates the working principle. Hot and cold cylinders of different areas were placed side by side, as shown by Fig. 3, with their pistons connected to cranks 135° apart. The bottom of the cold cylinder, *A*, was connected to the top of the hot cylinder, *B*, and vice versa through heating and cooling chambers, *C* and *D*, containing Stirling regenerators. The arrangement of the pistons was such that the

air was compressed in the cool cylinder, passed through the regenerator into the hot cylinder, where it was expanded, then transferred to the cold cylinder through the cooling chamber, and

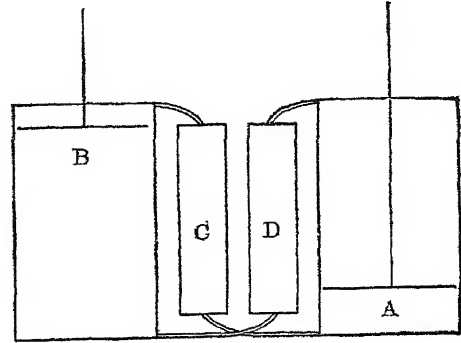


FIG 3

the cycle repeated. From four to six cylinders, each double-acting, were proposed to be combined in a series. A model of one of these engines was exhibited at the Paris Exposition of 1855. This same principle was embodied in an engine patented by the famous engineer Sir William Siemens in 1860, but he neglected to

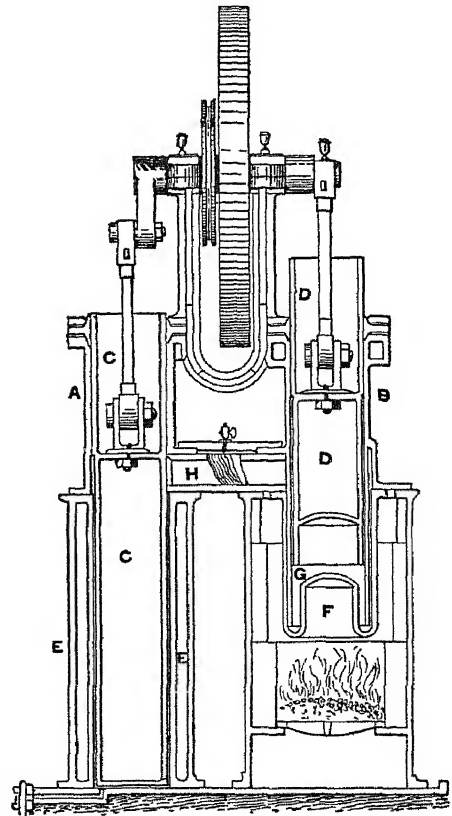


FIG 4 RIDER CALORIC ENGINE

put it into practical use. The Siemens engine employed four cylinders, each hot at one end and cold at the other, all connected to one shaft, and so arranged that the hot end of one communicated through a regenerator with the cold

end of the next. The heat was supplied by hot products of combustion from producer gas in a chamber connected with the hot ends of the cylinders, while the opposite ends were fitted with refrigerating devices. One of the latest forms of compression engines is the Rider, shown by Fig 4. In this sectional view *C* is the cold cylinder or compression cylinder, surrounded by the water jacket, *E*, and *D* is the hot cylinder. The compressed air from the cold cylinder is changed through the regenerator, *H*, to the hot cylinder, where it is expanded by the heat from the grate underneath the cylinder.

Hot-air internal-combustion engines, or, more properly, hot-air products of combustion engines, operate by forcing atmospheric air through a closed fire, which may be and generally is a solid fuel fire, and carrying the air and gases of combustion to the engine cylinder. An historic form of such an engine is shown by Fig 5. The furnace was placed in a chamber

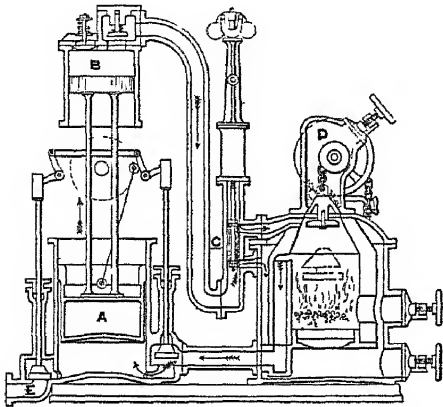


FIG 5 HOT-AIR PRODUCTS OF COMBUSTION ENGINE

strong enough to withstand the pressure. The compressing pump *B* forced air below the ash pit up through the fire, where it was expanded by heat and by combustion with carbon. Being admitted to the working cylinder against the piston, it was exhausted into the chimney. The furnace had to be charged with fresh fuel through a combination of double doors, *D*, working on the principle of an air lock. A hot-air product of combustion engine was described by Sir George Cayley, an Englishman, in 1807 and 1825, and again in 1837 this inventor patented a modification of the same design and built several engines, none of which gave any marked success. In 1821 Dr. Neil Arnott (qv), the celebrated scientist, took up the same idea and patented a form of engine in which, to avoid the abrading action of the ashes on metal pistons and cylinders, he used oil pistons. Following Cayley and Arnott, a number of inventors worked on the idea, among them being the Americans Stephen Wilcox, S. H. Roper, and Philander Shaw, each of whom built and sold a number of engines. Broadly speaking, the difficulties of operating these engines were so great that they recorded a general failure. These difficulties were caused by flue dust and the grit in the cylinders, the rapid destruction of the working surfaces and valves by the intense heat, and the practical impossibility of lubrication. They were also more bulky than other types of hot-air engines in proportion to the power developed.

The possibilities of the hot air engine as a competitor of the steam engine have been often urged, but so far it has never reached any practical success which warranted much hope that the competition would prove serious. With the improvements and progress in the internal-combustion motor using cheap fuels, hot air engines now are mainly of historic interest. The two sides of the question may be fairly and concisely summarized as follows:

The hot-air engine in small sizes is more economical than the steam engine of the same capacity. In larger sizes it has about the same economy as the less economical steam engine, measured in coal consumed per horse power. It has the advantage of avoiding the steam boiler as a magazine or reservoir of energy which may be liberated by accident so suddenly as to be explosive. It can be run by less skilled and expensive labor, and no steam runner's license is demanded. It is safe and odorless. The objections to the hot-air engine are the greater bulk and greater weight for the same power as compared with the steam engine, the low mean pressure with high initial pressure, which latter compels great strength of structure, the deterioration of heating surfaces exposed to high heats and consequent oxidation, the difficulties of packing and lubricating at high temperatures, the difficulty of regulation closely to varying resistances. If there is any danger to the present supremacy of the steam engine, it will be in relatively small plants that a hot-air engine can be a substitute, the gas or internal-combustion engine is more to be feared than the hot-air engine proper.

Bibliography. F. R. Hutton, *Heat and Heat Engines* (New York, 1899); C. H. Peabody, *Thermodynamics of the Steam-Engine and Other Heat Engines* (ib., 1909); Allen and Bursley, *Heat Engines Steam, Gas, Steam Turbines and their Auxiliaries* (ib., 1910); J. A. Ewing, *Steam Engines and Other Heat Engines* (ib., 1910); F. E. Cardullo, *Practical Thermodynamics* (ib., 1911); W. D. Ennis, *Vapors for Heat Engines* (ib., 1912); H. A. Garratt, *Heat Engines* (ib., 1912); Hirschfeld and Barnard, *Elements of Heat-Power Engineering* (ib., 1913); W. Inchley, *Theory of Heat Engines* (ib., 1913); William Ripper, *Heat Engines* (ib., 1913); E. M. Shealy, *Heat* (ib., 1914).

HOT-AIR TREATMENT. A method of treatment of sprains, flatfoot, arthritis, synovitis, gout, rheumatism, neuralgia, myalgia, sciatica, and chronic ulcers by means of air at a temperature of from 250° to 300° F. It was introduced in 1893, largely through Mr. Willet of St. Bartholomew's Hospital, London. Adjustable ovens are adapted to the joint or limb affected and are at first brought to a temperature of 150°. A sense of comfort follows, with copious sweating, enormous increase of circulation, and an anodyne effect. The heart rate increases from 10 to 25 beats, the respiration from 2 to 6 breaths a minute, the mouth temperature rises 2° to 5°. See BIER'S HYPERÆMIA.

HOTBED. Fermenting compost or manure covered with earth, and generally surmounted by a frame, for cultivating plants which require more than the natural heat of the climate, but not so much as to render the hothouse necessary. The heat is the result of fermentation. Hotbeds are in very general use for growing plants from seed in spring, to be planted in the open ground as summer advances, and for forcing vegetables.

and flowers. The material mostly used is horse manure, either alone or mixed with litter, but tan bark, leaves, the waste of flax, cotton, or woolen factories, etc., are sometimes substituted for it. It is necessary that the heat of very rapid fermentation be expended before the hotbed is planted, and it is usual, on this account, to prepare the materials some days in advance of planting. A hotbed is made highest at the back, sloping towards the south. The bed extends on all sides 12 inches or more beyond the frame, according to the temperature of the outside air. The frame has a movable glass sash or sashes, according to its size, or is covered with cloth. The thickness of the hotbed and of the earth upon it is accommodated to the purpose intended and the degree of heat required. When the heat decreases, it is for some purposes necessary to keep it up by "linings" of the same material as the hotbed, added to the sides of it. The sashes of hotbeds must be partially removed during the day to permit ventilation and the escape of vapor.

HOTCH/KISS, BENJAMIN BERKELY (1826-85). An American inventor, born in Watertown, Conn. of humble parentage. He was at an early age employed in a gun factory, where he came into contact with Samuel Colt (qv) in the manufacture of revolvers. During the Civil War he was engaged in the manufacture of ordnance in New York and later invented the Hotchkiss magazine gun, used by the United States troops in the West and the United States Marine Corps. This was followed in 1882 by the Hotchkiss machine gun, for use in the fighting tops of war vessels. He was also the inventor of several important improvements in projectiles and heavy ordnance. His guns were in general use throughout the armies and navies of the world until displaced in the more advanced nations by later inventions. His death occurred in Paris, where in 1870 he established a gun factory, a branch of which he was organizing in England at the time of his death. See MACHINE GUN, RAPID-FIRE GUN.

HOTCHKISS GUN. See MACHINE GUN, RAPID-FIRE GUN, ORDNANCE.

HOTCH/POT (OF *hochepot*, from O Dutch *hutsot*, chopped beef or mutton boiled in a pot, from *hutsen*, *hotsen*, to shake + *pot*, AS *pott*, from Ir *pota*, *puite*, Welsh *pot*, Bret *pōd*, pot, connected with Lat *potare*, Skt *pā*, to drink, Gk *porós*, *potos*, drunk). In law, the mixing and blending together of advancements made to children during a parent's life and of property left at his death, in order that the whole may be equally divided among all the children. According to Blackstone the doctrine came into English jurisprudence from the law of the Lombards, but the term is explained by him in the language of Littleton, as follows: "Hotchpot is in English a pudding, for in a pudding is not commonly put one thing alone, but one thing with other things together." By this housewifely metaphor, adds Blackstone, our ancestors meant to inform us that the lands which had been given to one or more daughters in frank marriage, as well as the lands descending to them in fee simple, should be mixed and blended together and then divided among all the daughters. After estates in frank marriage fell into disuse, the principle of the law of hotchpot was revived and applied by the Statute of Distributions (22 and 23 Car. II, c. 10). The provisions of this statute have been reenacted by the legislatures

of the United States with some shades of difference and on the basis of the rules as to hotchpot throughout the country. The great object of these rules is to produce equality among the children of a deceased person. Property which has been turned over to a child as an advancement, instead of a pure gift, is to be brought into hotchpot as a condition of his taking a child's share in the parent's estate. It is not necessary that he actually bring and surrender the very chattel or other form of property advanced to him. It is enough that its fair value be allowed for. In arriving at this value its worth is to be estimated at the death of the parent. Accordingly, where a slave boy, 12 years old, was given to a child as an advancement, the child was charged with the fair value of the slave at the father's death, not at the date of the gift, nor yet at the time of the distribution of the estate, which did not occur till a much later date. On the other hand, the profits of an advancement between the date of the gift and the death of the donor, or the enhanced value due to improvements, need not be accounted for. Consult the *Commentaries* of Blackstone and Kent. See ADVANCEMENT.

HOT CROSS-BUN. See CROSS-BUN.

HOTEL (Fr *hôtel*, OF *hostel*, from ML *hospitale*, large house, palace, inn). The origin of the modern hotel, especially in the United States, dates from the introduction of the railroad. Its advent transformed the small road house, which was planned for occasional guests, into the more pretentious hotel. Again, about 1888, came another revolution in hotel building, and the modern fireproof structures began to replace their poorly planned prototypes. Still later, the idea of specialization, i. e., of providing particularly for a certain class in the community, began to gain ground. The concentration of wealth, commerce, and industry in large cities attracted to them numerous persons for whose permanent or transient accommodation there were required comfort and luxury independent of a permanent domicile. In the United States there are four general kinds of hotels: (1) those which are run on the American plan, (2) those using the European plan, (3) those combining both systems, (4) the so-called apartment hotel, where suites of rooms, furnished or unfurnished, are rented for more or less extended occupancy, while a restaurant is maintained in the house primarily for the benefit of the guests. The European plan, on which practically all the great hotels of Europe are run, consists in paying a certain daily rate for a room and then paying separately for whatever food is ordered. By the American plan the guest pays a certain amount a day for both room and meals. With changes in life and habits the American plan is encountered less frequently, especially in the hotels of large cities, where a charge is made for rooms and meals are usually *à la carte*, the guest paying for what he orders. The difference between an American hotel which is run on the European plan and the continental hotel is that in the former the various minor items, such as light and service, are included in the price of the room, while on the Continent these items are often charged for separately, though this custom is not as prevalent as formerly. One of the most characteristic establishments of Europe is the village road house, or inn, which is found throughout the Continent, but especially in France, Germany,

and Austria. It is, as a rule, marked by simplicity and comfort and is preferred by many to the more elaborate hotel. Indeed, the small hotel in Europe is a model of its kind, and its cuisine is generally superior to that of second-class hotels in the United States, though great improvement is to be noted in recent years, and extensive touring in motor cars has brought about better conditions of accommodations. The large first-class hotels of the United States are to-day unexcelled for comfort, luxury, convenience, and service. Both in Europe and America changes have been wrought in recent years through the operation of hotels by large corporations or syndicates, which control large hostelrys in different cities. Sometimes these may be operated as a chain of hotels under a single management, as by a large railway system, with purchasing and commissary departments available or there may be but two or three hotels where the same customs, traditions, and conditions are maintained. Such high organization of the business has led to large investments in enormous buildings, where every convenience and luxury is provided for the guests and where facilities are employed to attract to its restaurants, banquet rooms, tea rooms, music room, etc., other patrons, so that the greatest return will be secured on a very large investment. The following description applies to the modern hotel.

By far the greater part of the space in a modern hotel usually is occupied with private rooms for guests, but the central feature of the design of a modern hotel is the great office and lobby, or chain of connected halls and corridors, which form the common place for arrival and departure and for meeting people from both without and within the building. A large and generally imposing entrance and vestibule lead to the office or lobby, which frequently occupies an inclosed central court, two or three stories in height, while sometimes there are several such entrances. The lobby generally contains not only the public office of the hotel, often with separate desks for its room clerks, cashier, mail clerks, and information clerks, but also news and cigar stands, a telegraph office, and telephone booths, or, if these are not in, they are adjacent to and connect with the lobby. Theatre and other amusement tickets may be secured, baggage checked, cabs ordered, flowers and small articles purchased, and high-grade shops are usually near by. Reading, writing, and smoking rooms also adjoin the lobby, and there may be parlors or reception rooms near at hand, with tea and palm rooms arranged for music. The hotel parlors are more generally on an upper floor, commonly on the second. Both public and private parlors are usually provided. Another marked feature of a hotel is its dining room. Here the object is to get a large, unobstructed floor space, with plenty of natural light, where possible, and at the same time to have the room only second in general accessibility to the lobby or office. Smaller public dining rooms, frequently called breakfast rooms, are generally provided, and also a gentlemen's cafe and grill room, while roof or other outdoor dining or tea rooms are provided for the summer months, besides which there are private dining rooms in proportion to the size and general character of the hotel. A conspicuous feature of American hotels is the bar, which is likely to be near, if not connected with, the cafe, and in the larger hotels several of these may be provided. The bar is often on

the office floor, but where this floor is well above the street level the bar and cafe, together with barber shop, lavatories, and perhaps the public baths, are on the ground floor or in the basement. The hotel kitchen must be either near or in speedy communication with the dining room. It may be on a different floor if dumb-waiters are provided. Where there are numerous dining rooms, public and private, several kitchens are a practical necessity.

Spacious stairways almost invariably lead from the office or lobby to the parlor or dining room, although the universal use of elevators has lessened their importance, and they are apt to be more for decorative effect than for extensive use save in an emergency. An impressive feature of some of the finest hotels is a gallery above and around the lobby giving access to whatever public rooms may be located on the second floor. The elevators should be conveniently arranged so as to give quick access to private dining rooms, ballrooms, and parlors and there should be separate elevators for servants and freight. The guests' rooms if any, on the lower floors of large hotels are generally in suites (bedroom, parlor, and bathroom), but similar suites may, of course, be distributed on the other floors, and in the newer hotels the upper floors are often the most luxurious in their arrangement and appointments. Above the second floor the building commonly assumes, at least in city hotels, the form of a hollow square, or rectangle, though many large hotels are built L-shaped or with a series of wings to secure a maximum number of outside rooms. The guests' rooms are arranged along corridors—the outer ones fronting on the street, the inner ones on the court. Even third or fourth rate hotels of the present day rarely offer guests a room which does not have an ample window opening into the outer air. Fire escapes must be provided on each floor, and red lights are placed near them and at the heads of staircases to mark their location. Besides the various rooms, public and private, already mentioned, baggage and storage rooms, ballrooms, halls for concerts, conventions, and other assemblies, music rooms, and often roof gardens, are, some or all, found in the best hotels. Indeed, there is practically no end of the comforts and conveniences available in a large hotel. Not only are maids and valets at the command of the guests, but physicians, trained nurses, and even an operating and hospital room are found in at least one hotel, which has in addition a nursery for the children. Specialization has been carried to such an extent that, in at least one large metropolitan hotel, a floor has been set aside for guests whose working hours are such that they are obliged to sleep during the day, and another floor for women. The great revival of interest in dancing in 1913 and 1914 attracted many persons to hotels for dinner and supper as well as the superior music and floors that were provided, such being beyond the reach of a private dwelling.

Mountain and seaside resorts call for various modifications in design, including many spacious verandas and balconies, sun parlors for winter use, and other features suited to the changed conditions of a hotel life where recreation and social amusements, or perhaps the search for health, are the main objects. The constructional features of hotels are not sufficiently different in the material employed and the way in which it is put together to require separate treatment.

In modern city hotels, which are for the most part buildings of extreme size and height, the same conditions as regards fireproof construction obtain as are found in the best office buildings. The fire hazard of hotels at summer and health resorts is attracting increased attention, and with added comfort greater safety is being demanded by guests and enforced by insurance and State authorities.

The governing principle in the design of a hotel should be to make it as safe, convenient, comfortable, and generally attractive as possible. Unfortunately the order of these requirements sometimes is reversed, or, at least, inadequate attention is given to the safety of the guests. Safety is used broadly here, to include all that goes to make the building structurally sound, to reduce dangers from fire, and to conduce to good sanitation. Fireproof construction (qv) is now universally demanded for all hotels of any size, and there should be adequate fire escapes, plainly marked both by night and day, and fire-protection facilities. The latter, at least in all large hotels, include apparatus in the way of fire pumps, stand pipes, hose, chemical extinguishers, and the like, and regular drills of employees and tests of alarms and other apparatus and appliances. A plentiful supply of water is, of course, essential. This necessity frequently entails an independent pumping plant, and often in addition filtration, and always requires an extensive system of piping for both hot and cold water. To meet the demands for purity in drinking water, it is frequently advisable to install a filter plant in the basement of the hotel, or, where possible, to sink deep artesian wells. Spring waters are often supplied at table, and travelers demand that drinking water not only shall be safe but shall be clear and palatable.

Both public and private baths are required. The latter should be in separate rooms with independent air and light. Private water-closets generally accompany private baths. The public lavatories and water-closets, both as regards spaciousness and good sanitation, may be taken as a fair index of the rank of most hotels. In general, all plumbing should be of the simplest possible design and should be readily accessible for inspection and repairs. In the choice of floors and floor coverings, wall finish and decorations, window and other hangings, it should never be forgotten that frequent and thorough cleansing is imperative, and that everything that creates or serves as a lodging place for dust or that cannot be thoroughly disinfected is a menace to health. With the more general provision of vacuum-cleaning apparatus there is little excuse for dust, and it is rarely to be found in the best hotels so equipped. The furniture demanded and installed in modern hotels is of high grade, and the same as regards design as would be found in well-fitted private residences. Expert decorators are employed not only for the adornment but for the furnishings, and with luxury and elegance there has been a distinct gain in taste and homelikeness. Ventilation is most important and, together with heating, its arrangement should be intrusted to a heating and ventilation engineer. In the best hotels in the colder sections of America the buildings are heated with steam or hot water throughout, supplemented in some instances by open fireplaces. Automatic heat control is frequently found, but this must be supplemented by devices that will enable a

guest to adjust the temperature of his rooms to his own requirements. Well-equipped laundries, with drying closets, are becoming more and more common even in smaller hotels, and special arrangements are made for supplying prompt service to transient guests. Electric lights are provided in most hotels, and the illumination of both public and private rooms is carefully studied and planned so as to secure the maximum effect and convenience.

Whatever the rank of a hotel, some means is provided for making known wants without leaving one's room. The most common method is a simple push button electrically connected with an annunciator in the hotel office. In some hotels elaborate signal systems are provided so that by moving a pointer over a dial in one's room any want may be made known in the office. Such cumbersome devices, however, largely have been superseded by the house telephone system, with a telephone in every room, which often through the central switchboard can be connected with ordinary local and long-distance lines. In large hotels there may be a floor operator or manager on each floor who receives visitors' cards through pneumatic tubes from the reception-room floor, supervises the chambermaids and bell boys of that floor, and performs similar duties.

The management of modern hotels presents a difficult executive problem. The number of employees (which varies according to the hotel, but which is always over 50 per cent of the guests), the constantly shifting crowd of guests, the numberless mechanical details, and the large amount of provisions and supplies which is necessary, all complicate the problem. Under the manager, and directly responsible to him, are a steward and a chef. The former has charge of the supplies and general supervision over the housekeeper, storekeeper, head laundress (and their subordinates), and over the clerks of the accounting department and the plumbers, carpenters, and upholsterers. The chief engineer also is no unimportant individual, as he is charged with the oversight of the electric-lighting plant, heating and ventilation, refrigeration, and elevator system, all of which consume large quantities of fuel. Everywhere in the modern hotel mechanical appliances are employed. For transmitting messages, as the order of a dinner, the telautograph may be employed, the occupancy of a room may be denoted in a special indicator, the whereabouts of a chambermaid may be revealed automatically. In the kitchen manual labor is supplanted wherever possible by automatic machinery, and temperature regulators are used in ovens and ranges, not to mention automatic measuring devices, knife cleaners, dishwashers, soup passers, and similar appliances. The steward generally buys the necessary provisions and supplies. Most of the provisions are ordered fresh every day though usually the larder is stocked with a supply sufficient for two days, while the supply of dry stuff on hand is sufficient for a week. The chef has absolute charge of the kitchen and its staff, which includes special cooks in various departments. The steward makes his purchases according to lists furnished him by the chef, who oversees all details in connection with the cuisine. A head waiter with numerous assistants superintends the dining rooms and arranges for private dinners and suppers. For the history of the early hotel, see INN.

HOTEL, IN LAW See INNKEEPER

HÔTEL CARNAVALET, kur'na'va'lê' See MUSÉE CARNAVALET.

HÔTEL CLUNY. See MUSÉE CLUNY

HÔTEL DE CLUNY, ô'têl' de klu'nê' See CLUNY, HÔTEL DE.

HÔTEL DE RAMBOUILLET, de ran'-bû'ya' See RAMBOUILLET, HÔTEL DE

HÔTEL DES INVALIDES, dà zân'va'lêd'. See INVALIDES

HÔTEL DE VILLE, de vêl The French name for a town hall, applied especially by preeminence to the city hall of Paris. This was originally on the left bank of the Seine, whence it was transferred to a position near the Châtelet on the right bank in the thirteenth century, and in 1357 to the Place de la Grève, now the Place de l'Hôtel de Ville. Under Francis I a new edifice was begun (1539) by the architect Domenico da Cortona or Boccadori (or, as is contended by some authorities, by Pierre Chambiges), it was completed under Henry IV, but altered and extended under later reigns. It was totally destroyed by the Communists in 1871, with the loss of 600 of their companions who were unable to escape from the building, and was rebuilt between 1873 and 1883. The new building, by Ballu and Déperthes, is a fine Renaissance structure, with an imposing façade enriched with allegorical groups and single statues typifying the principal French cities. The interior is richly ornamented with sculpture and paintings by great French artists and contains a fine grand staircase and a sumptuously decorated festival hall. See TOWN HALL.

HÔTEL DIEU, dyê. One of the oldest hospitals in Europe and the most important in Paris, said to have been founded in 660. It formerly stood on the south side of the Ile de la Cité and was connected with an annex on the right bank of the Seine. In 1772 the hospital was destroyed and subsequently rebuilt on the same spot. The institution was transferred in 1868 to its present position on the north side of the island, near Notre Dame. It contains 559 beds, and three medical professorships are attached to it.

HOTHAM, hûth'am, WILLIAM, first BARON (1736-1813). A British naval officer, educated at Westminster School and at the Royal Naval Academy. He was appointed to the North American station in 1751, in 1759 captured a French frigate, and having joined Lord Howe (1776) at the American station, participated in the engagement in the cul-de-sac of St Lucia in the West Indies in 1778. On his return to England in 1781 many of the ships of his convoy were taken from him by a superior French force. In 1782, with the rank of commodore, he joined the Mediterranean fleet, to the chief command of which he was eventually appointed, succeeding Admiral (Viscount) Hood. He had been promoted rear admiral in 1787 and vice admiral in 1790 and on his return to England in 1795 was made admiral. The French fleet, which he twice met in situations of advantage to himself escaped with minor losses. In 1797 he was made Baron Hotham of South Dalton.

HOTHOUSE. A building intended for the cultivation of exotic plants which require a higher temperature than that of the open air. The term is more generally applied to those buildings in which artificial heat is used. It includes such terms as "stove," "bark stove," etc.,

in the former of which the heat was derived from fires, and in the latter by fermenting tan bark, which not only produced heat, but kept the air moist. See GREENHOUSE.

HOTMAN, ô'tman', or **HOTMAN'NUS**, FRANÇOIS (1524-90). A French jurist and author, born in Paris. He received the degree of doctor at Orleans, and afterward, though but 22 years old, gave lectures on Roman law at the University of Paris. At this time he became a convert to the Reformed religion and was forced to take refuge in Geneva. On the recommendation of Calvin he was made professor of belles-lettres and history at Lausanne in 1549. Afterward he went to Strassburg as professor of civil law (1555), then to Valence (1562) and Bourges (1567). For a short time he returned to Paris, where he actively interested himself in the fortunes of the Huguenots, but the Massacre of St Bartholomew sent him back to Geneva. His last years were spent at Basel. Hotman's books had a great influence on the time and wrought a reformation in the study and teaching of law. His two most important works are *L'anti-tribonian, ou discours sur l'étude des lois* (1567) and *Franco-Gallia* (1573), often reprinted with changes of matter and titles.

HOT SPRINGS. See GEOLOGY, SPRING, THERMAL SPRING.

HOT SPRINGS. An Alaskan town, the centre of the Hot Springs mining district on Baker Creek, near the mouth of the Tanana River (Map Alaska, J 3). It is also a health resort and truck-farming district, which received its name from its numerous hot springs, which are the best known of all in Alaska. Its population was 101 in 1910.

HOT SPRINGS. A city and the county seat of Garland Co., Ark., 54 miles west by south of Little Rock, on the St. Louis, Iron Mountain, and Southern, the Memphis, Dallas, and Gulf, and the Chicago, Rock Island, and Pacific railroads (Map Arkansas, B 3). It is one of the most beautiful towns in the United States and is widely noted for the hot waters that flow from 72 springs, included in a space of 10 acres on the west side of Hot Springs Mountain. The waters of these springs range in temperature from 76° F to 157° F and are beneficial in a multitude of diseases. In 1832 four sections of land, the thermal springs being in the centre of the district, were set off by Congress as a government reservation. Since then the government has established on the mountain the Army and Navy General Hospital and expended large sums in improving and developing the reservation. The government bathhouses, extending along Central Avenue are tasteful in design and have attractive surroundings. There are many hotels here, the Eastman, the Arlington, the Majestic, and the Park ranking among the largest in the country, and the city is one of the most popular resorts in America, having annually 150,000 visitors. The city has a fine courthouse, city hall, and opera house. One of the features of the place is the tower on the summit of the mountain, from which four States can be seen. Settled about 1804, Hot Springs was incorporated as a town in 1876 and was chartered as a city of the first class in 1879. The government is administered by a mayor and a municipal council. Pop., 1900, 9973, 1910, 14,434, 1914 (U S est.), 16,334.

HOT SPRINGS. A town in Madison Co.,

N C, on the French Broad River, 38 miles northwest of Asheville, on the Southern Railway (Map North Carolina, B 4) It has an elevation of more than 1300 feet and is a noted health resort because of the medicinal value of its hot mineral waters These springs are visited by many persons yearly Dorland Institute, a mission boarding school for mountaineers, was established here in 1894 The principal industries are lumbering and mining Pop, 1900, 445, 1910, 443

HOT SPRINGS A city and the county seat of Fall River Co, S Dak. 104 miles south of Deadwood, on the Chicago, Burlington, and Quincy and the Chicago and Northwestern railroads (Map South Dakota, A 4) It is situated at an altitude of 3400 feet, in the beautiful Minnekahta (hot water) vale, at the source of Fall River and is noted for its thermal and medicinal springs, which have more than a local reputation Hot Springs is the seat of the State Soldiers' Home and contains a Carnegie library and several hospitals, sanitariums, and hotels, notably the Battle Mountain Sanitarium, built by the United States government at a cost of \$2,000,000 The city is the commercial centre for important mining, live stock, and lumber interests, and has good water power, manufactures of stucco, and pink sandstone quarries Pop, 1900, 1319, 1910, 2140

HOT SPRINGS. A health resort in Bath Co, Va, about 75 miles north of Roanoke, on the Chesapeake and Ohio Railroad (Map Virginia, E 3) It contains mineral springs having medicinal properties, a public library, and the old Homestead Hotel The region was settled about 1740 and attracted people to its springs as early as 1754. Pop (permanent), about 500.

HOTSPUR. A name given to Henry Percy (qv)

HOTTENTOT BREAD (*Testudinaria elephantipes*) A species of the family Dioscoreaceae, indigenous to South Africa Its slender, many-branched, vine-like stems, which die down during the dry season, grow to a height of 30 to 40 feet and bear bright heart-shaped leaves. The hemispherical or nearly globular rootstock, sometimes 3 feet in diameter, protrudes conspicuously aboveground and is covered with a brown corklike substance with many-sided protuberances separated by deep cracks and fissures Both the scientific name and one of the common names, elephant's foot, have been derived from fancied resemblances to the foot of an elephant It is sometimes called tortoise plant. The fleshy interior affords food to baboons and other animals The plant is cultivated as a greenhouse curiosity The rootstocks are exported apparently dead, but when placed in the ground they soon throw out rootlets, and stems grow rapidly from the upper surface The genus *Testudinaria* is combined with *Dioscorea* by some botanists See DIOSCOREACEAE

HOTTENTOT FIGS See ICE PLANT.

HOTTENTOTS (*Khor-Khoin*, men of men) A race in South Africa (census of 1904, 85,892 Hottentots proper, 1138 Korana, 7955 Griqua in the Cape Colony, Natal, and the Orange River Colony; census of 1909, 14,359 Hottentots in German Southwest Africa). Their domain is said to extend from Orange River to Wal-fish Bay and far into the Damara upland. A study of their somatology shows them to have the following characteristics, cranial capacity,

1290, cephalic index, 74.3, stature, 160.4 centimeters They are accordingly short, but not dwarfish Their skin is yellow, brown, or gray, not black, the hair is long and woolly, the cheek bones are prominent, eyes are dark chestnut or black, wide apart, the nose is very broad and flat, nostrils thick, the mouth is large, with heavy, upturning lips and enormous prognathism, chin pointed, and receding jaw They have little beard, and no hair on the body The ears are large, without lobules (See Colored Plate of AFRICA, DARK RACES of) Steatopygia is common There are three divisions of them—the Hottentots proper, the mongrel Griquas of Griqualand West, and the Koranas on the Orange, Vaal, and Modder rivers Between the persecutions of the spreading Bantu tribes and later the occupation of the lowlands by Dutch and English settlers, most of them have been driven into the mountains and waste places, and they are slowly dying out They live in low, oval, dome-shaped huts, made by setting rough poles in the ground, bending them down, and tying them together Over all is a thatch or layer of mats woven by the women In the centre of each hut is the fire pit where meat is roasted, and around the sides are holes in which they sleep They wear little costume beyond a cloak of skin, but smear their bodies lavishly with fat and soot At the time of the advent of the Europeans their wealth consisted largely in cattle Their chief weapons were bows and poisoned arrows In their villages the huts were arranged in a circle, forming what is known as a kraal A portion of the Hottentots shared the fortunes and stood the oppressions of the settlers, and their descendants form a mixed race, many of whom are prosperous in flocks and herds

Hottentot men do little work besides helping to tend cattle and occasionally hunting and fishing Some pursue the trades of smith or armorer, tailor or tanner The women make cords, mats, and pottery, cook, tend cattle, and perform most of the labor

Trade is carried on by barter in cattle, and oxen are used for bearing burdens Little beef is eaten, and meat is procured by hunting, milk being the chief food, from their environment The Hottentots secure many roots and fruits, which supply the vegetable element in their diet Cooking of meat is by roasting or seething in a skin bag by means of hot stones. They make an intoxicating mead and chew a narcotic root

Puberty, marriage, and funeral feasts are held Their amusements are mock fights, games accompanied with music, drinking, and smoking Family affection seems strong, and they are friendly, liberal, and hospitable among themselves.

Their yellow skin has been an enigma to anthropologists, and the discovery of similarities in grammar, together with the existence of words representing abstractions of a high order, strengthened the theory that the Hottentots had separated from the Caucasian kindred in the north in prehistoric times, settling the southern portion of the continent, where they were pressed upon later by the black Bantu tribes More probably they are an isolated race, like the Australians The theory that they are lost Hamites has recently been readvanced by Meinhof, largely because of the existence of grammatical gender, and Von Luschan has attempted

to support this linguistic argument on somatological and cultural grounds. The linguistic basis of the theory seems, however, very far from convincing, for the Hottentot gender system differs widely from that of the Hamites.

A peculiar phonetic element shared with the Bushmen consists of clicks, resembling the smacking of the mouth in clucking, etc., made by pressing the tongue against the teeth, the palate, the sides of the upper jaw, or doubling it backward and then producing an explosive noise. These clicks usually occur at the beginning of words, and while each one is not difficult to imitate, the European is quite unable to follow them up with the vocal sounds that make up the word. The name Hottentot is an effort of the Dutch to imitate the dental clicks pronounced like the expression of surprise, *tut! tut!* with an inhalation. See AFRICAN LANGUAGES.

The unit of government among the Hottentots was the *kraal*, with its subchief, who with the leading men had jurisdiction even to the extent of the death penalty. The tribes were ruled by hereditary chiefs, who were greatly revered and received their pay in kind, being entitled to a share of whatever was killed or produced. Descent was in the female line for sons, and initiation into the tribe was with ceremonial scarification of the body. Their instruments of music were the *gorah*, or musical bow, a rude fiddle, *l'gutha*, an imitation of European violin, a *tomo*, a bow rubbed with another bow, and a single-head drum.

The religious belief of the Hottentots was in keeping with their social scale and organization. They held to the existence of the soul after death. The ruler of all things is a deified patriarch, *Heitsi-Eibeb*, or a Great Captain *Tsu-goab*, who was formerly one of their mighty chiefs and came from the East. Hence all Hottentots' graves are oriented, and when they pass a cemetery they leave stones on the spot to express good will and ask a blessing. The existence of this practice in former times enables the student to follow the trail of the Hottentot in his wanderings. The cult of these people is obscure. It has been stated that they had no temples or places of united worship, no altars on which offerings or sacrifices were laid, and no class with priestly function; yet medicine men, witch doctors, or sorcerers, were common among them, called in to heal the sick by magic. An immense folklore is based on the primitive conceptions of ghosts, charms, signs, offerings, luck, and causation by spirit influences that cram the air. The folk tales reveal many resemblances with those of the neighboring Bantu, indicating a common origin.

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HOTTINGER, hŏt'ting-ēr, JOHANN HEINRICH (1620-67). A Swiss Orientalist and biblical scholar. He was born at Zurich. After studying at Geneva, Groningen, and Leyden, he became professor of Church history in Zurich, where he remained until 1655, holding successively the chairs of theology and Oriental languages and rhetoric and logic. In 1655 he became professor of Oriental languages at Heidelberg. In 1661 he returned to Zurich to take charge of a German translation of the Bible, and in 1662 he was elected rector of the University in Zurich, which title he kept for life. In 1667 he was called to Leyden, but was drowned at Zurich by the capsizing of his boat while on a pleasure excursion before leaving for his new work. Hottinger was a prolific writer on Oriental subjects. The most important of his works are the following: *Thesaurus Philologicus seu Claris Scripturæ* (1649), *Historia Ecclesiastica* (1651-67), and the *Etymologicon Orientale, sive Lexicon Harmonicum Heptaglotton* (1661).

HOTTINGER, JOHANN JAKOB (1783-1860). A Swiss historian and educator. He was born at Zurich, studied there and at Leipzig, and, returning to his birthplace, taught history in the girls' academy, in the art school, and in the university (1833). As a member of the council on education, Hottinger was prominent in the introduction of reform measures. He edited the *Archiv für schweizerische Landeskunde* (1827-29), *Archiv für schweizerische Geschichte* (1843-53), and the *Schweizerisches Museum für historische Wissenschaften* (1837-39), and wrote *Geschichte der Eidgenossen während der Zeiten der Kirchentrennung* (1825-27), *Huldreich Zwingli* (1841), *Geschichte des Untergangs der Eidgenossenschaft der 13 Orte* (1844), and *Hans Konrad Escher von der Linth* (1852).

HOT-WATER HEATING. See HEATING AND VENTILATION.

HOT-WIRE ANEMOMETER. See ANEMOMETER.

HOUARIOS, hŏ-a'ri-ŏz. Small coasting vessels and pleasure boats used in parts of the Mediterranean. They bear lateen sails and have each two masts and a bowsprit.

HOUBARA, hŏu-ba'ra. See BUSTARD.

HOUBRAKEN, hŏu'bra'ken. A Dutch family of artists.—ARNOLD (1660-1719) was born at Dordrecht and studied under Samuel van Hoogstraeten and others. In 1713 he visited England. He practiced his art chiefly at Amsterdam and painted a number of historical pictures and figure subjects, none of great value. His chief claim to fame is a biography of Dutch painters, *Groote schoubouogh der nederlandsche konstschilders en schilderessen* (1718), an invaluable contribution in view of the absence of a similar account, but which, by reason of its uncritical and anecdotic character, must be cautiously used. Consult Hofstede de Groot, *Arnold Houbraken und seine Groote Schoubouogh* (The Hague, 1893).

His son and pupil, JACOBUS HOUBRAKEN (1698-1780), a well-known engraver, was also born at Dordrecht and practiced chiefly at Amsterdam. His first work was a series of portraits for his father's book. He did 100 plates for *The Heads of Illustrious Persons of Great*

Butain (1743-52), by T. Buehs, but his best work is a series of scenes after C. Troost. His individual portraits are said to number more than 600. (Consult *Alexander Ver Huell, J. Houbraken et son Œuvre*, Paris, 1875-77.) After Houbraken's death engraving in the Netherlands became almost a lost art.

HOUDAN, hū'dan. A breed of domestic fowls, in the French class with the *Creve-cœur* and *La Fleche*. They are widely bred in the United States and are hardy and profitable. These fowls are of medium size, mottled black and white in color, with black wing bars and primaries, and a heavy crest divided in the middle of the crown in the cock, but falling backward in the hen. They have five toes, like Dorkings. A hen should weigh six pounds, a cock seven. The other breeds mentioned are highly esteemed in France, but little known in America.

HOUDARD, ō'dar', GEORGES LOUIS (1860-). A French composer and musical savant, born at Neuilly-sur-Seine. While still studying composition under Hillemeier and Massenet, he manifested a strong leaning towards musical archaeology and research. His reputation was securely established by his very first book, *L'Art dit Grégorien d'après la notation neumatique* (1897). This was followed the next year by the not less important *Le rythme du chant dit Grégorien d'après la notation neumatique*. Other works, all embodying the results of original research, are *La richesse rythmique musicale de l'antiquité* (1903), *La cantilène Romaine* (1905), *La rythmique intuitive* (1906), *L'ade-mecum de rythmique grégorienne* (1912). His compositions, the most important of which is a *Requiem*, belong exclusively to the field of sacred music.

HOUEDETOT, ō'd-tō', ELISABETH FRANÇOISE SOPHIE DE LA LIVE DE BELLEGRADE, COUNTESS D' (1730-1813). The mistress of Saint-Lambert and probably also of Rousseau. She was the wife of a French general and the sister-in-law of Madame d'Épinay. Rousseau mentions her in his *Confessions* and attributes to her influence much of his poetical inspiration. Their love is partly represented in *La nouvelle Héloïse*. Her face was plain and slightly scarred with small-pox, but she possessed a brilliant wit and a sunny disposition.

HOUDIN, ō'dān', ROBERT (1805-71). A French conjurer and mechanician. His apprenticeship to the watchmaking trade schooled his fingers in the manipulation of intricate machinery, and his hatred of shams led him to apply his mechanical knowledge to the unveiling of the conjuring tricks of his time, especially those which appealed to the religious side of human nature. By producing more wonderful illusions, with the credit given to natural causes, than those which his predecessors had attributed to supernatural, he completely revolutionized the art of magic and was honored by medals in 1844 and 1855 for his mechanical toys and the practical value of some of his inventions. In 1852 he was sent by the government to Algiers to convince the Arabs by his magic that the French were a far superior race. He was the author of an autobiography, *Robert Houdin* (1857), *Confidences* (1859), *Les tricheries des Grecs dévoilées* (1861), *Secrets de la prestidigitation et de la magie* (1868), reprinted as *Comment on devient sorcier et Magie et physique amusante* (1877), translated into English by Hoffmann

Consult H. Houdin, *The Unmasking of Robert Houdin* (New York, 1908).

HOUDON, ō'dōn', JEAN ANTOINE (1741-1828). One of the foremost French sculptors of the eighteenth century. He was born at Versailles, France, March 20, 1741, the son of a domestic attached to the house of De la Motte, a courtier. His first impulse towards art came from the splendid decorative sculpture of the park at Versailles, and as a boy of 10 or 12 he haunted the ateliers of the Royal School of Sculpture. In the catalogue of the Salon of 1795 he calls himself a pupil of Slodtz, but he was really much more influenced by Pigalle and the younger Lemoyne. In 1761 Houdon won the *Prix de Rome*, but was not influenced greatly by the treasures of art in Rome. His personality was too healthy and powerful to follow the lead of any other master and could only be satisfied by its own direct and intelligent interpretation of nature. His stay in Rome is marked by two characteristic and important productions—the superb "Ecoche," an anatomical model, which has served as a guide to all artists since his day, and the statue of St. Bruno in the church of Santa Maria degli Angeli in Rome, a work of very powerful characterization.

After 10 years' stay in Rome Houdon returned to Paris and soon became one of the foremost French sculptors, he was admitted to the Academy April 23, 1769. In 1785 he visited America in company with Benjamin Franklin in order to make the statue of Washington which had been ordered by the Legislature of Virginia. He visited Washington at Mount Vernon, and the marble statue which followed now adorns the capitol at Richmond. During the French Revolution Houdon was in danger before the Tribunal for executing a statue of St. Scholastica, but succeeded in convincing the judges that his saint was in reality a statue of Philosophy. Houdon died July 16, 1828, in Paris.

Houdon was a perfectly trained and competent technician, producing easily and abundantly, with equal success both in marble and bronze. His knowledge of anatomy was marvelous, and he was a thorough naturalist who succeeded best in portraiture. His name is principally connected with a fine series of more than 200 portrait busts, which form one of the chief monuments of French sculpture. Among these were those of Diderot (about 1769), Benjamin Franklin (1778), and of Gluck (1777), on the death of Rousseau in 1778 he made two busts in bronze and terra cotta from a cast of his face. One of the most characteristic of his busts is that of Molière, in the Théâtre Français, Paris. Among his statues are those of "Morpheus," in the Ecole des Beaux-Arts, "Diana the Huntress," the best of his nude female figures, "The Bather," combined with which there was originally a negress pouring water over her mistress's shoulders, in the Altman collection, Metropolitan Museum, New York, and especially the portrait statue of Voltaire (1781), in the Théâtre Français, one of the finest in modern art. Consult Hermann Dierks, *Houdons' Leben und Werke* (Gotha, 1887), Albert Terrade, *Autour de la statue de Jean Houdon* (Versailles, 1892), Hart and Biddle, *Jean Antoine Houdon* (Philadelphia, 1911).

HOUGH, hūf, GEORGE WASHINGTON (1836-1909). An American astronomer, born at Tribes Hill, Montgomery Co., N. Y. He graduated at Union College in 1856 and three years afterward

was appointed assistant astronomer at the Cincinnati Observatory. The next year he became astronomer and director of the Dudley Observatory in Albany and in 1879 went West to become director of the Dearborn Observatory and professor of astronomy in Chicago University, but in 1887 he gave up the latter position to accept a similar one in Northwestern University. He discovered more than 600 double stars and invented a number of astronomical instruments. His chief publication is *Annals of the Dudley Observatory* (1866-71).

HOUGH, LYNN HAROLD (1877-) An American Methodist Episcopal clergyman and theologian, born at Cadiz, Ohio. He graduated from Scio College in 1898 and from Drew Theological Seminary in 1905 and studied also at Columbia University. He entered the ministry in 1906. After serving large churches in Brooklyn and Baltimore he was elected professor of historical theology in Garrett Biblical Institute in 1914. He lectured much before institutes and conferences, contributed to the religious press, and is author of *Athanasius the Hero* (1906); *The Love of Books* (1911); *The Theology of a Preacher* (1912); *The Men of the Gospels* (1914).

HOUGH, THEODORE (1865-) An American physiologist, born at Front Royal, Va., and educated at Johns Hopkins University (A.B., 1886, Ph.D., 1893). From 1893 to 1903 he was instructor and assistant professor of biology at Massachusetts Institute of Technology, from 1893 to 1907 was also instructor in physiology and personal hygiene at the Boston Normal School of Gymnastics, and from 1903 to 1907 was associate professor and professor of biology at Simmons College, Boston. In 1907 he became professor of physiology at the University of Virginia. He is coauthor of *The Human Mechanism* (1906). His researches deal mainly with cardiac inhibition, alcohol and fatigue, the physiology of muscular fatigue and soiness, and the effect of temperature on cutaneous circulation.

HOUGH, WALTER (1859-). An American ethnologist, born at Morgantown, W. Va. He was educated at Monongalia Academy, West Virginia Agricultural College, and the University of West Virginia (A.B., 1883; Ph.D., 1894). He was assistant in 1886-94, assistant curator of ethnology from 1896 to 1910, and curator after 1910 in the United States National Museum. In 1892 he went with the United States Commission to Madrid and was made Knight of the Order of Isabella. He was a member of Dr. J. Walter Fewkes's expedition to Arizona (1896-97), went to Mexico with Dr. J. W. Rose (1899), and made important explorations in the Southwest in 1901, 1904, and 1905. He published some 35 papers on ethnology.

HOUGHTON, hō'ton. A village, port of entry, and the county seat of Houghton Co., Mich., on Portage Lake, near Lake Superior, with which it is connected by a canal, 94 miles northwest of Marquette, on the Duluth, South Shore, and Atlantic, the Copper Range, and the Mineral Range railroads (Map Michigan, A 1). It is the centre of a rich mineral district, copper being mined and exported in great quantities. The Michigan College of Mines, established here in 1885, occupies many fine buildings, which, with the high school and county courthouse and jail, are the finest structures of the village. Other features are the United States

customhouse, county sanitarium, Good Will Farm, Carnegie library, and agricultural school. Among the industrial establishments are a large foundry and machine shop, lumber mills, dry docks, coal docks, breweries, and manufactories of cigars, candy, handles, jewelry, etc. The water works are owned by the municipality. Pop., 1900, 3359; 1910, 5113.

HOUGHTON, GEORGE HENDRICK (1820-97) An American Protestant Episcopal clergyman. He was born in Deerfield, Mass., and graduated at New York University in 1842 and at the General Theological Seminary in 1845. In 1848 he organized, and until his death was rector of, the church of the Transfiguration, better known as the "Little Church around the Corner" in New York City. The story which explains the origin of this name is that, a certain actor having died, his friends requested one of the city pastors to conduct the funeral services. The latter refused, but advised them to try the "little church around the corner." Dr. Houghton was distinguished for his activity in benevolent work. At his death he was succeeded by his nephew, George Clarke Houghton.

HOUGHTON, HENRY OSCAR (1823-95) An American publisher, born at Sutton, Vt. He graduated in 1846 at the University of Vermont and worked in Boston as compositor and newspaper reporter. In 1849 he entered the Cambridge firm of Messrs. Bolles and Houghton printers and in 1852, upon Mr. Bolles's retirement, transferred the office to its present site and established the well-known Riverside Press. In 1864 he became a member of the publishing firm of Hurd and Houghton, which in 1878 became Houghton, Osgood, and Company and in 1880 Houghton, Mifflin, and Company. In 1872 he was elected mayor of Cambridge. In 1878, by acquiring control of the large list of the old firm of Messrs. Ticknor and Fields, the Houghton house secured exclusive publication rights for the works of many leading American authors, such as Emerson, Longfellow, and Holmes. For many years *Webster's International Dictionary*—now *Webster's New International Dictionary*, published by G. and C. Merriam Company of Springfield, Mass.—has been printed by the Riverside Press.

HOUGHTON, hā'ton or hōu'ton, RICHARD MONCKTON MILNES, LORD. See MILNES, RICHARD MONCKTON.

HOUGHTON, hō'ton (WILLIAM) STANLEY (1881-1913) An English dramatist. He was born in Manchester, was educated at the Manchester Grammar School, and was employed for a time in the cotton trade. From 1906 to 1912 he was assistant dramatic critic and reviewer for the *Manchester Guardian*. He was connected with the movement that resulted in the establishment by Miss Horniman (see HORNIMAN, ANNIE E. F.) of her repertory theatre at Manchester in 1908, and it was there that his first plays were produced—*The Dear Departed* (1908), *Independent Means* (1909), *The Master of the House*, and *The Younger Generation* (1910). The first and last of these were produced in London in 1912-13 by the Repertory Players, who gave there in 1912 his best play, *Handle with Care*, a gloomy piece of Lancashire mill-town realism. This play was produced in New York the next year, as was *The Younger Generation*. His other plays, all produced in London in the last few months of his life, were, in 1912, *Fancy Free*, *Puppets*, and

Pearls, and, in 1913, *Trust the People* and *The Perfect Cure*. His *Five One-Act Plays* were collected in 1913.

HOUGUE, LA See **HOGUE, LA**

HOULTON, hōl'ton A town and the county seat of Aroostook Co, Me., 140 miles northeast of Bangor, on the Bangor and Aroostook and the Canadian Pacific railroads (Map Maine, E 2). It is surrounded by a farming and lumbering district and has considerable commercial importance. There are foundry and machine shops, saw, planing, and molding mills, woolen mills, starch factories, a flour mill, a butter factory, and a large slaughterhouse. The town has a public library, two hospitals, parks, and the Ricker Classical Institute. The water works and electric-light plant are owned by the municipality. Pop. 1900, 4686, 1910, 5845.

HOUMA, hō'ma (Indian, mound) A city and the parish seat of Terrebonne Parish, La., 54 miles southwest of New Orleans on the Barataria Canal, the Bayou Terrebonne, and on the Southern Pacific Railroad (Map Louisiana, H 7). It has several oyster-packing establishments, a large moss factory, canneries, saw and planing mill, brickkilns, manufactures of sugar, molasses, and lumber, and considerable trade in rice and grain. The water works and electric-light plant are owned by the city. Pop. 1890, 1280, 1900, 3212, 1910, 5024. The place was first inhabited by the Houmas Indians.

HOUND (AS *hund*, OHG *hunt*, Ger *Hund*, Goth *hunds*, connected with Lat *canis*, Gk *κύων*, *kyōn*, OIr *cú*, Lith *szū*, Skt *śān*, dog). Broadly the term "hound" distinguishes hunting dogs, who follow their animal quarry by scent, from the greyhound group, who hunt by sight, and also from the field dogs (q v).

Hounds, then, comprise the bloodhound—or sleuthhound, as he is still called in Scotland—the buck or stag hound, the foxhound, the otter hound, the harrier, the beagle, the basset, and the Great Dane. The origin of all the breeds of hounds is the Talbot, or old Southern hound (*Canis sagax* of Linnaeus), of which probably no true example exists to-day, although a few were preserved well up into the nineteenth century. These dogs were remarkable for their great size and strength, the depth of the chest, length of ears, and the breadth of the head in the region covering the olfactory nerves, hence their capacity for tracing the "sleuth," "slot," or track. Before the Christian era the bloodhound, or sleuthhound, of Great Britain had become so celebrated for these qualities that, as we know on the authority of Gratius, they were imported into Gaul. Strabo, who flourished somewhat later, confirms this, and Oppian praises their powers of scent and their courage.

The Bloodhound. This hound is the nearest to the original Talbot and for centuries was the hound of the huntsman whose quarry had to be followed by scent. During many centuries he was the principal agent in Europe in bringing the bear, the boar, and the stag to bay, but swifter breeds were gradually evolved, and the bloodhound's occupation dwindled to that of employing his extraordinary capacity to maintain a trail, however crossed and faint, in tracking human poachers to their hiding places. Had it not been for this need, the breed would in all probability have entirely disappeared, as, in fact, it nearly had when in the middle of the nineteenth century a few enthusiasts took up the breeding and restored the dog to his rightful

position. The stories of carnage following the dog's overtaking man do not apply to the true bloodhound. When he has tired or fixed his man, he gives tongue and takes care that the pursued does not escape, but he will never lay hold viciously and maliciously. The bloodhound's practical use to-day is in tracking fugitives, refugees, and missing persons, and for this purpose packs of them are maintained by many public authorities. Their capacity to do this borders on the incredible, for, however the footsteps of the one sought for may be crossed by others, in country or street, the nose of this hound, once it has taken up the trail, will follow it. Running water is apparently the only medium that will baffle him. This sense is, of course, natural, but to develop it and bring the dogs use of it into subjection and make it intelligently useful, the puppy has to be trained and his powers gradually extended and kept in practice.

The characteristics adopted as the standard by the American Bloodhound Club depict the modern dog. He should be from 25 to 27 inches high at the shoulder for dogs and a little less for the other sex, in color, black and tan—the black, extending to the back, top of neck, and top of head, is, however, always more or less mixed with tan. The tan is a deep rich red, the coat should be short and hard on the body, but silky on the ears and top of head. The ears should be long enough to overlap each other when drawn down together in front of the dog's nose. The eyes should be hazel, deeply sunk, and with triangular lids, showing the third eyelid, or "haw." The head should be large in all dimensions except width, the muzzle deep and square, the brows fairly prominent. The skin covering the forehead and cheeks is wrinkled, and the general expression of the whole head is majestic. The neck is long, to enable him to drop the head to the trail without altering his pace. The chest and ribs are wide and deep, and the legs straight and muscular, the ankles of full size, and the feet round and catlike.

The Foxhound. As a breed distinctly characteristic and solely used for the hunting of the fox, the foxhound is a comparatively modern development, not reaching farther back than 200 years, but it has been developed from the bloodhound and the Talbot or old Southern hound, traceable for 2000 years. When England gradually became more or less deforested, and animals of the chase had more open spaces for their speed, it naturally followed that this dog had to have increased pace, and for all kinds of game except the very heaviest the bloodhound and Talbot gradually gave place to lighter hounds grafted on the old model. The stag, or buck, hound was the first variety of what we now class under the general term "foxhound." He was the first to come and practically the first to go, for not one pack of the larger buckhound exists to every hundred packs of the true foxhound. The establishment of regular packs of hounds for hunting the fox, the first of which was the Pythley in 1750, stamped the breed on the lines from which the English hound has never varied—indeed, into some packs not a single drop of extraneous blood has ever been introduced. Most of the packs established in the latter part of that century are still, so far as other blood is concerned, in unbroken existence, such as the Belvoir (founded, 1756), the Quorn, and the Cottesmores.

Where the game chased is as swift and crafty as the fox, and the country is open, yet studded with hedges and walls, which act as an ever-recurring screen from sight, it follows that the pursuing hound must have unfailing powers of scent, endurance, and swiftness. These are the three characteristics of the bony, muscular, compact, big-bodied, typical foxhound. His height is not so material as are other points. 23 to 24 inches at the shoulder is a safe medium. Nor is color imperative, though necessarily, from the jealousy with which the breed has been guarded, there are no variations outside the yellow or tan, black and white, in ever-varying and clearly marked blotches over the whole body. The head should have a girth in front of the ears of fully 16 inches, the nose should be $4\frac{1}{2}$ inches long, and wide, with open nostrils, and ears set low and lying close to the cheeks. The neck should taper from the shoulders to the head. The chest of a dog 24 inches high should be more than 30 inches in girth, to give the necessary lung capacity, and the ribs must be deep and grade into the loins without an observable break. The hind quarters must be very strong, and the front legs straight and strong. So important are these two features that in judging they call for 20 points out of the total 100. The modern dog, being better trained, is lighter than his ancestor, 70 to 80 pounds is the limit of a dog's weight, and the female may be 10 pounds lighter.

In America the local conditions differ so widely and are so various that it is almost impossible to define the American foxhound. In some districts, like Maryland and in the Genesee valley, the fox is followed very much after the English fashion, on horseback, over rolling grasslands, elsewhere the dog does the hunting and the man waits behind a wall on the supposed runaway with a gun, in a third the men follow the dogs afoot, in still others they hunt the fox at night. It follows, therefore, that the dogs locally needed must be as various as the methods, and they are so, but, speaking broadly, and of the hound favored by the American Foxhound Club, it need only be said that it is bred on lighter and finer lines than its English ancestor. It is shorter at the shoulder—21 to $23\frac{1}{2}$ inches—and weighs not more than 57 pounds. The chest is narrower in proportion to depth than the English standard, 20 inches in a $23\frac{1}{2}$ -inch hound is considered good. In most other respects, naturally, the requirements are very similar. One minor point of some importance may be noticed: the English dog always has his ears artificially rounded, while the American dog retains them untrimmed.

The Harrier. From the earliest times the hare has been hunted by dogs. There is a cameo among the Greek gems which depicts him chased by his special enemy, the long dog, or greyhound, but he had an equally persistent foe in the old Southern hound, the immediate ancestor of the modern harrier. The original harriers must not be confused with the dwarf foxhound, which does duty as a harrier to-day. It was only after the draining and clearing of England and Ireland at the beginning of the nineteenth century, when for the first time the chase could be followed on horseback, that the old Sussex blue-mottled harrier, the first step in refining the old stock, came into fashion. The persistence with which a scent-hunted hare can be worried by dogs with good noses, and the sport it

afforded to watch the tricks and subtleties of hare and hounds, made hare hunting very popular. In order further to insure the needed qualities, the smaller foxhound strain was called into requisition, and "Trian," a sire from the Duke of Grafton's kennel, became the foundation of the pack of Sir John Dashwood King, of West Wycombe, whence the strain spread throughout Great Britain. There are still packs of the older and slower kind, however, and there is a "standard of points," but it is scarcely worth repeating here.

The Beagle. The harrier looks like a diminutive foxhound, and the beagle looks like a diminutive harrier, but he is not that. He has a most ancient lineage, and for beauty of form, gentleness of manner, sweetness of voice, and hunting qualities he has no equal. The length of the separate existence of the beagle has allowed opportunity for many varieties besides the "rough" and the "smooth." A very pygmy breed called "lap-dog beagle" was once popular. So small were one pack of these that the whole 10 or 12 couples were carried to the field in a pair of panniers slung across a horse. Even the common-sized beagle is slow enough to allow any ordinarily active man to follow the chase afoot. There is a Beagle Club in America which sets the standard, and field trials are annually held under its auspices. Though diminutive some classes not exceeding 15 inches, the beagle is every inch a dog with a wiry frame and a determined though placid look. His standard of form closely follows that of the foxhound.

The Basset. This dog is the French equivalent of the English beagle, inasmuch as he is the diminutive of an ancient breed, and his quarry is the rabbit. In other respects, as the beagle follows the characteristics of the old Southern hound, the basset resembles them other ancient common ancestor, the bloodhound. His body is longer, and his legs even shorter than the beagle's. His head is long and narrow, with heavy flews, and his forehead wrinkled to the eyes, which, like the bloodhound's, show the hawk; his expression is dignified, the neck is very powerful, with heavy dewlaps, and the ears so long he is likely to tread on them, for his legs are not more than 4 inches long. The stifles are bent, and the quarters full of muscle. He is very barrel-like and has a character easily recognized.

The Dachshund. Except that this dog hunts rabbits and, like the beagle and the basset, is short on the leg and long in the body, he has nothing in common with the others. He is a curious mixture. He has the smooth coat and body of a pointer, the tail and nose of a black and tan terrier, the ear of a foxhound, with more than the foxhound's sensitiveness, the hinder legs taller than the front ones, and the latter comically bowed. He is a very ancient breed. One of his kind is painted on an Egyptian monument of the period 2000 B.C. He has many modern admirers, and a club devoted to his interests, whose standard calls for a general appearance long, low, and graceful, not cloddy, a wedge-shaped head, long and lean, broadest at its base, skull moderately arched, bridge of nose somewhat curved or nearly straight, no stop, muzzle strong, not snipy, but fairly pointed, with open nostrils, ears medium, long, broad, and soft, round at end, set on high and well back, eyes showing no white and with keen expression, jaws strong, with strong and regular

teeth, neck tapering from the shoulders to the head, shoulders well muscled and plastic, chest well developed, especially the breastbone, body long, back ribs very short, foreribs well sprung, forelegs short and strong in bone, forearms crooked, feet large, round, and strong, hind legs smaller in bone and higher than forelegs, lower thigh very short and forming nearly a right angle with the upper thigh, feet of hind legs smaller than those of forelegs, coat short (except on the wire-haired), dense, strong, and glossy, but short and fine on the underside of the body, skin loose and supple, color red in all tints, black and tan, liver and tan, gray and tan, and spotted. White is objectionable, except in a small stripe from the breastbone (which is prominent) downward.

Turnspit A dog closely akin in build to the dachshund, and called the bath hound, or turnspit, was used in England in some localities well into the nineteenth century to drive a wheel by which the roasting spits were turned before the fire. He was put in a box in such a position that he could apply his forefeet one after another to a paddle wheel, and by that means the spit went round. A similar dog, used for rabbiting, was early known to English hunters as the wry-legged terrier.

The Otter Hound This is the gamiest and pluckiest of dogs. His prime requisite is such hardihood as will enable him to follow the otter to its water den and fight him there, withstanding without complaint the severest bites from this most vicious of animals. If fish are to be "preserved" in certain streams, otters must be limited, and to this end otter hounds are a necessity. This dog must have powerful jaws and good teeth, also a rough grizzly coat, which defies alike the chill of the water and the teeth of the otter. Beneath the wry outer coat an undercoat of oily wool is essential. This hound is a large dog, standing about 25 inches high, and weighing 50 to 75 pounds.

The Great Dane, or German Boar Hound This is the last visible remnant of one of the two great classes into which dogs were divided by Xenophon and the early Greek writers—the "fighting dogs," famed for their huge frame, their pugnacity and ferocity under training. Most of the ancient nations cultivated this dog as an ally in their armies. Arrian enumerates those of "the Mede, Celt, Ser or Indian, Albanian, Iberian, Lycaonian, Libyan, Egyptian, Magneſian, Molossian, Briton, Arcanian, and a few others nearly allied." Cyrus had his war dogs, and at Marathon dogs shared the honors of the day. That their use was continued by the Romans is evidenced by the fact that from the ruins of Herculaneum have been exhumed the calcined corpses of dogs wearing mail armor. The use of this huge dog for aggressive pugnacity has long since passed, but as a companion and safeguard he has always been valued by German game wardens.

The standard adopted by the Great Dane Club of America maintains all the great and marked qualities of this giant of the canine world, decreeing for dogs a minimum height of 30 inches and a weight of 100 pounds, with an approximate height of 32 inches and a weight of 140 pounds. It requires a powerful and elegant brute. The body must be long, round, and compact; the coat short and fine; the ears small and carried high; the eyes small, deeply set, and with a sharp expression. The recognized colors

are the various shades of gray or blue, mouse color, black, white, red or fawn, also brindle or tiger-striped or white ground, with patches of dark colors.

The Mastiff This dog (the *Canis anglicus* of Linnaeus) is a true hound and undoubtedly is of British origin, for he was exported from there before the Roman conquest of the islands. He was used by the Britons as a guard dog for their persons and their flocks, more than in the hunt, and he remains preeminently the watchdog of the present day. Watching has become almost instinctive with him. He is the largest and most muscular dog known, exceeding even the Great Dane, and has the courage of the bulldog, yet withal is so gentle that he is the especial favorite of children. In color he is apricot, or silver fawn, or dark fawn brindle, with the muzzle, ears, and nose black in all cases, his coat is short and close-lying, his head is a very ideal of strength and massiveness, and it is set on a neck and chest in proportion. No height is set in the standard, but a dog which must weigh from 155 to 175 pounds should be very little under three feet tall.

Bibliography Consult authorities mentioned under Dog.

HOUND A small shak. A name more common in Great Britain than in America for the dogfish of the genus *Mustelus*, especially the blue or "smooth" hound (*Mustelus canis*), common to both sides of the Atlantic. See DOGFISH.

HOUND/FISH 1 A needlefish, especially *Tylosorus raphidoma*, also called guardfish. See NEEDLEFISH, and Plate of NEEDLEFISH, PIKES, ETC. 2 A dogfish.

HOUND, HOUNDING A hound is a dog employed in the chase, specifically, in England, one adapted to fox hunting. Hounding is the pursuit of game by hounds. The keeping of hounds and the sport of hounding are, to a greater or less extent, regulated by law. Those who follow hounds in fox hunting, in England, are exempt to some extent from the common-law liability of other trespassers, such sport ranking as a privileged pursuit. The employment of hounds in deer hunting is prohibited by statute in some of the United States. Consult Peer, *Cross Country with Horses and Hounds* (New York, 1902), and the authorities referred to under GAME LAWS.

HOUND'S-TONGUE (so called from the shape and texture of the leaves), *Cynoglossum*. A genus of coarse-appearing, small-flowered plants of the family Boraginaceæ, of which there are many species. The common hound's-tongue (*Cynoglossum officinale*) is a native of Europe, Asia, and Africa, introduced in North America. It has soft downy leaves, of a dull-green color, purplish-red flowers, and a stem about 2 feet high. Its odor is very disagreeable. The root was formerly administered in scrofula, dysentery, etc., and is said to be anodyne. It is also one of the pretended specifics for serpent bites and hydrophobia. The hound's-tongue is considered a pernicious weed on account of its burs, which adhere to the wool of sheep and to other animals. *Cynoglossum virginianum*, known as wild comfrey, is a common plant from New York to Florida, and *Cynoglossum boreale* occurs in Canada and northern United States as far west as Minnesota. The species of *Echinosperrum*, formerly united with *Cynoglossum*, are weeds, *Echinosperrum* being the beggar-lice

or sticktight. The quality of sheep's wool is often considerably lowered from the abundance of their burrs in it.

HOUNSLOW HEATH A region west of the township of Hounslow, London, covering in 1546 an extent of 4293 acres. It was formerly notorious as the resort of highwaymen, and it was customary to leave the bodies of those who had been executed hanging on gibbets along the road. In 1686 James II established a camp on the Heath for the purpose of overawing the Londoners. Extensive barracks were erected in 1793, and part of the land is now occupied by powdermills. The region is in great part under cultivation and inclosed.

HOUR (AF *ure*, OF *ure*, *hure*, *ore*, *hoir*, Fr *heure*, from Lat *hora*, from Gk *ώρα*, hour, season) A measure of time equal to one twenty-fourth part of a day (qv). As there are two kinds of days, the solar and sidereal, so there are two kinds of hours, the solar and sidereal. The latter is shorter than the former by 9 856 solar seconds.

HOUR/GLASS. An instrument for measuring intervals of time. It is made of glass and consists of two bulbs united by a narrow neck. One of the bulbs is nearly filled with dry sand, fine enough to run freely through the orifice in the neck, and the quantity of sand is just as much as can run through the orifice in an hour if the instrument is to be an hourglass, in a minute if a minute glass, etc. The obvious defects of this instrument are the expansion or contraction of the orifice produced by heat or cold, and the variations in the dryness of the sand, all of which produce deviations from the true measurement of time. Instruments constructed on this principle are occasionally used by navigators in "heaving the log," for the purpose of measuring the time during which the log line is allowed to run out. Similar instruments are also employed by cooks in fixing the proper time for boiling eggs.

HOURI, *hou'ri* (Ar *hawrâ*, woman with bright black eyes, from *hawra*, to have brilliant black eyes). The beautiful celestial maidens, described in the Koran (Sura lvi, 24, lv, 55 et al.) and Mohammedan tradition as dwelling in Paradise, whose companionship is one of the rewards held out to the pious Moslem. Numerous descriptions amplifying the notices in the Koran are found in Mohammedan writers. They repose on gorgeous couches in pavilions of pearl. Their countenances are so bright that one can see his face reflected from a houri's cheek. They are made by "a peculiar creation," not of clay, like ordinary women, but of musk, saffron, incense, and amber. While retaining all the qualities of virgins, they have none of the failings of women, remain ever young and free from physical defect, and have the power to conceive and bear children at will, who within an hour grow to maturity. The later Mohammedan theologians, like Ghazali (qv), whose more refined instincts were offended by this rather sensual picture of Paradise, endeavored to place an allegorical interpretation upon the houri, but there can be little doubt that to Mohammed and to his immediate followers, as to the bulk of present-day Mohammedans, they represent an intense reality. This follows from the details of the houri given by Mohammed and amplified by subsequent writers, on the basis of tradition, which accord with the general view of Paradise as a place where life will be full of secret delights, where

there will be plenty of water, delicious fruits, with attendants waiting on the pleasure of the inhabitants, and the like. Mohammed's conception of Paradise, while based in part on the current Jewish and more particularly Christian views embodied as its original factors the adaptation of these views to his own mental horizon and to that of his surroundings, and one is inclined to conjecture that the houri represent the reverse of the popular conception of demonic beings, frequently pictured as female spirits, who plague and torture man in this world.

HOURS. See **HORA**.

HOURS, Book or. The name given to books of private devotion designed for the laity, which were very popular and in general use throughout the Catholic church from the fourteenth to the sixteenth centuries. These books were wont to open with an almanac giving the movable feasts, etc., followed by a calendar, which in turn was followed by passages from the Gospels, by portions of the canonical hours, penitential Psalms and litanies, and, finally, by diverse miscellaneous prayers. These devotional works were also called *Primers*, or *Primers*, and frequently they were referred to simply as *Hours*. Both before and after the discovery of printing they were often beautifully illuminated, and fine examples of them are to-day much coveted by collectors. Great personages were fond of having these books made specially for themselves, with decorations and illustrations of an individual appeal. A book responding to this taste is the famous *Tres riches heures* of the Duc de Berry, where pictures by Chantilly, appropriate to the different months, represent the Prince's châteaux set off against landscape backgrounds exquisitely executed in color. In the embellishment of these works of devotion distinguished artists—miniaturists, engravers, and others—labored. Consult E. H. Longlois, *Essai sur la calligraphie des manuscrits du moyen-âge et sur les ornements des premiers livres d'heures imprimés* (Rouen, 1841), Felix Soleil, *Les heures gothiques* (ib., 1882), Wordsworth and Littlehales, *Old Service Books* (London, c 1890), Armand d'Herbonnez, "Les heures de Chantilly et l'exposition des primitifs français," in *Revue des Questions Historiques*, vol. lxxviii (Paris, 1905).

HOURS, CANONICAL. See **CANONICAL HOURS**.

HOURS OF LABOR. See **LABOR LEGISLATION, EIGHT-HOUR DAY**.

HOEWICH, *hou'wich*, ISAAC A. (ARONVICH) (1860—) An American statistician, born at Vilna, Russia. He graduated from the Classical Gymnasium at Minsk in 1877, studied at the St. Petersburg Academy of Medicine and Surgery, and at the University of St. Petersburg, and graduated from the Demidov Juridical Lyceum at Yaroslavl (LL.M., 1887) and from Columbia University (Ph.D., 1893). He was admitted to the bar in Russia in 1887, in Chicago in 1893, and in New York in 1896, and he practiced law until 1900. He served as docent in statistics at the University of Chicago in 1893-95, as translator to the Mint, Washington, in 1900-02, as expert special agent of the Census Bureau in 1902-06 and 1909-13, and as statistician of the Public Service Commission of New York in 1908-09. He is author of *Peasant Migration to Siberia*, in Russian (1887), *The Economics of the Russian Village* (1892), *Immigration and Labor* (1912).

HOUSATONIC, *hou'sa-tôn'ik* A river of

Massachusetts and Connecticut (Map Connecticut, C 5), which rises in the Berkshire Hills about 2 miles south of Hinsdale, Mass., flows northward past that town, then northwestward to Dalton, then southwestward to Pittsfield, where it turns southward through Connecticut, entering Long Island Sound, four miles east of Bridgeport, after a course of 150 miles. It supplies water power to numerous manufactories.

HOUSE (AS *hūs*, ME *hous*, OHG *hūs*, Ger *Haus*, perhaps akin to Eng *hide*, to conceal). A human habitation of fixed and permanent character, as distinguished on the one hand from huts, cabins, tents, wigwams, etc., and on the other from palaces (qv). The word is also used in other senses, e.g., of a dynasty, a commercial company, a superstructure on a vessel (deck house), a shelter for vehicles (carriage house), etc. In this article it is discussed only in its primal meaning.

The history of human habitation is important, both socially and architecturally, since it is intimately concerned with the social and family life both of the individual and of the community. Probably 99 per cent of all buildings in the world are houses, and in the plan, arrangement, construction, and decoration of the house one may trace the progress of human society and civilization. The house, as distinguished from the tepee, wigwam, or kraal, embodies and is the product of the family life as against that of tribe or clan, and since the earliest temples were undoubtedly conceived of as the dwellings of the gods, they were planned after the type of the human house, so that all religious architecture has sprung from that of the primitive house.

Little is known about the houses of the ancient Egyptians and Assyrians, as the only extant ruins of dwellings are of palaces, not common houses, and the pictures and reliefs on the monuments throw little light on the form and construction of the latter class. We know much more about the primitive Greek house, from the ruins of Mycenæ and Tiryns, more, indeed, than about those of the historic period, of which the remains are very scanty. The Mycenaean house consisted of a hall (*megaron*), with four columns about the central hearth, an anteroom, or *prodomos*, and a porch, or *aihoussa*. The rooms, few or many, were grouped around the *megaron*. The type of the Greek house of historic times has probably been preserved for us in the Roman or Pompeian house, whose *atrium* (qv) recalls the primitive Greek *megaron*, surrounded by the various living rooms, while the *faux* takes the place of the *prodomos* and *aihoussa*.

Throughout the entire Mediterranean basin and as far East at least as the Euphrates it has been the immemorial practice to build all houses of any pretension whatsoever around a court (qv), of greater or less size. Even in Paris to this day the larger houses are built around courts. The Spaniards carried their *patio*, or court, with them, so to speak, to Mexico, Central and South America, and the West Indies, where it is still the custom, as about the Mediterranean, to build each house around a *patio*. Security and privacy are afforded by the court, from which the living rooms receive both access and light, without exposure to the dust, noise, and publicity of the street.

The excavation of Pompeii (qv) has given us almost complete details of the Roman pro-

vincial town house of the last century B.C. and first century A.D. in southern Italy. This was usually of one story, although portions might have a second story. It comprised an entrance passage (*faux*) leading from the street to the first atrium, or court, with its two lateral extensions, or *alæ*, its roof open in the centre (*compluvium*) and discharging its rain water into a central basin below, the *impluvium*, its *tablinum* where the family records and tablets were kept, three or four small rooms opening from it, and beyond these the *fauces*, or passages connecting it with the second court. This was larger than the atrium, was surrounded with columns, adorned with basin, fountains, marble table, flowers, and statues, and flanked by living rooms, while on one side or at the end was the *triclinium*, or dining room, open to the court. Beyond this, again, was the garden. The *cubicula*, or sleeping rooms, were hardly more than cells, and the kitchen was small and primitive. In crowded cities, at least in Rome, there were also tenement houses of many stories, but of their form and arrangement we know nothing.

The *villa* (qv) was an establishment with many wings and numerous rooms, approaching the elaborate elegance of a palace. In central Syria there are many ruins of houses of the late Imperial and early Christian centuries, showing courts only in part inclosed by buildings, the other sides protected by high stone walls, and a similar arrangement is found in many mediæval French buildings, e.g., the Hôtel Cluny in Paris, the Hôtel Jacques Cœur at Bourges, Hôtel d'Assézat at Toulouse, and others. In the ancient Roman houses one notes the scanty provision for indoor life and for individual privacy. The nearest approach to our "living rooms," parlors, and drawing-rooms was the peristyle, where in sheltered corners, under the roof or awnings, a couch, chairs, tripod, and table might be grouped for rest and familiar converse. In the villas, on the other hand, there was an abundance of special accommodations, but these were only for the rich.

In northern Europe the Teutonic and Slavic races developed a quite different type of house, taking its light and air from the outside, not from an interior court, and having its rooms therefore more compactly put together, in two, three, or even four stories. The climate, with its rain and snow, forbade the flat roof, and the high gabled roof was universal. The mediæval houses of north European cities, closely built in blocks, taking light from front and rear only, were sometimes of stone, more often of half-timber (qv) construction. In the country the house was evolved out of the barn, for the primitive type sheltered under one roof horses, cattle, and the family. A fireplace at one end of a central hall, stalls along one side for the beasts, along the other for the family, and lofts above—such was the type, surviving still in some Swiss chalets. As civilization developed, and the demand for privacy and comfort increased, rooms were partitioned off, and finally the live stock was removed to separate quarters, connected with the house only by a common courtyard inclosed by a wall. The central space became the spacious, lofty hall or gallery (see GALLERY, HALL) of the manor house, in which, as in the peristyle of the Romans, the social life of the family was passed. About the huge fireplace at one end of the hall, with its projecting hood or mantle, was the gathering place of

the family, the servants and feudal dependents gathered at the other end. The hall was the common dining room.

In the fifteenth and sixteenth centuries the spread of the Renaissance and the growing security of public institutions and private life gave a great impulse to the development of domestic comfort and convenience, of privacy and elegance. In England a carved screen in the hall now separated the family from the servants, everywhere rooms were multiplied, many of them provided with fireplaces. In England the number of chimney stacks and then elaborate decoration are especially notable. City houses, still in southern Europe built around or partly around courts, became architecturally sumptuous. The stairs were everywhere made more and more spacious and important—at first of spiral form in turrets, one for each group of rooms, they were now built in straight flights with landings, starting not from a court but from the hall. Corridors were introduced into the planning, securing private access to every room. This was one of the greatest of all improvements in house planning and marked the attainment of complete privacy for the individual. It came earlier in the North than in the South. In Italy and Spain the court arcade provided independent though less private access than the corridor to the rooms of two or three stories. See MANOR HOUSE, MUSEE CLUNY.

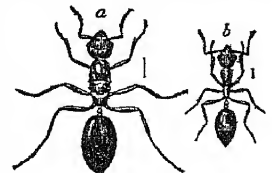
Modern individualism has tended to greater variety of house type than was ever known before. Even in the houses of one country or city the greatest variety is seen, especially in rural and suburban houses, where limitations of space are less exacting than in closely built towns. Local building materials play a great part in these variations, which are too numerous to be even catalogued here. The English manor house retains many of its mediæval features—its great hall and stairs irregular plan, kitchen wing, high gables, multiplied chimneys, garden front with terrace, and inclosed kitchen or servants' court. The modern German country house is more compactly built, but more irregular and picturesque, than the average modern French château, which since the time of Henry IV (1589-1610) has displayed a somewhat formal regularity, with a compact plan instead of an open or inclosed court. The American country house varies both with the region and the individual, the country houses of the very wealthy reproduce French, English, and Colonial types. Thus, Biltmore, in North Carolina, is a French château of the sixteenth century. The Colonial types are derived from the pre-Revolution and post-Revolution houses respectively, of the North in wood and of the South in brick, and these from the English Queen Anne and Georgian styles. In city dwellings we recognize four main types with many subtypes: (1) the French, built between the garden in the rear and the service court in the front, (2) the Italian and Spanish, built wholly around a court, or patio, (3) the mansion, isolated in its garden or set upon the street with the grounds on the other three sides, (4) the house in a block, as in Venice and in all north European and many American cities. This type is much subdivided according to the planning, arrangement of hall and stairs, position of kitchen and dining room, etc. Until about 1880 all American city houses in closely built towns were of almost

identical plan, with a basement, high stoop, narrow hall and straight stairs, and rooms at front, back and one side of hall. Great variety has replaced this dull uniformity.

Very interesting are the smaller rural and suburban houses of modern times especially in England, Germany, and the United States. Those of England are peculiarly interesting in exterior design, picturesque use of material and harmony with the landscape. In the United States wood has been the dominant material, and the piazza or veranda an essential feature of the design, the plans are irregular, the masses picturesque, convenience and personal comfort are sought everywhere. But with much that is admirable in these houses they have not yet attained that pervading charm that is noticeable in England. The Colonial type—rectangular, spacious, and dignified—is much seen in the smaller towns. Brick, concrete, and hollow tile are gradually replacing clapboards and shingles for the exteriors of American rural houses, the extreme inflammability of the wooden houses and the increasing price of lumber have stimulated this change. Half timber (qv) and brick are the chief materials in England, except in some districts where stone abounds and clay is scarce. On the continent of Europe city houses are of brick or stone, country houses almost universally of brick or rubble, stuccoed, except in Switzerland, parts of Russia, Sweden, and Norway, and Turkey, where wood abounds. The wooden mansions of the Bosphorus are extremely picturesque, and their planning is not unlike that of the Colonial mansions of the United States.

Bibliography. C. D. Daly, *Architecture prise au XIXe siècle*, series 1-3 (Paris, 1870-77). E. E. Viollet-le-Duc, *Story of a House*, translated by G. M. Towle (Boston, 1874), id., *Dictionnaire Raisonné de l'Architecture* (10 vols., Paris, 1876), id., *Habitations of Men in all Ages*, translated by Benjamin Bucknall (London, 1876), Charles Garnier, *L'Habitation humaine* (Paris, 1891), Russell Sturgis, *Dictionary of Architecture* (3 vols., New York, 1901), *Handbuch der Architektur* (Leipzig, 1911). See APARTMENT HOUSE, CASTLE, MANOR HOUSE, PALACE, also BUILDING and CARPENTRY, for American frame construction.

HOUSE ANT. The little red ant of households (*Monomorium pharaonis*), a species which has accommodated itself perfectly to the conditions of civilization. It nests in the walls of houses or in rubbish in cellars or old closets and feeds on all sorts of household stores. It becomes a great nuisance, not so much from the amount it eats as from its inordinate propensity for getting into things, especially sugar, sirup, and sweet substances generally. Careful watching will sometimes reveal the crack from which most of them come, and the nest may thus be found and destroyed. They may be trapped by thousands by a sponge moistened with sweetened water, which is daily relieved of its burden of ants by plunging it into scalding water. The cracks by which the ants enter storerooms and pantries may be plugged with cotton soaked



RED HOUSE ANT
a, female, b, worker,
in relative proportions

with kerosene, or the entire house may be fumigated with bisulphide of carbon or hydrocyanic acid gas. Directions for such fumigation are printed in circular form by the Department of Agriculture at Washington and are sent to all applicants free of charge. Two little black ants (*Monomorium minutum* and *Tetramorium cespitum*) are also found in houses, but nest outside. Consult Howard and Marlatt, *Principal Household Insects of the United States* (Department of Agriculture, Washington, 1906), and other publications of the department.

HOUSE-BOATING. The passing of the summer time, as a recreation, on what really is a flat-bottomed raft supporting a more or less extensive and luxurious suite of rooms, occupying the centre of the raft. Generally at each end of the house there is an open deck, and there is an open gallery along the sides, the top, which is railed round and covered by an awning, often forms an open court or garden. This manner of passing the summer holidays began about 1870 on the Thames, England. Today a hundred house boats are to be found on it, and a weekly paper is published, which gives the whereabouts of every such boat from day to day. Some of these boats are models of beauty in decorations and fittings, and veritable floating palaces of luxury and fashion. They are either poled from point to point or towed from the path by a horse or else by an auxiliary launch. The proximity of riverside villages and inns precludes the necessity of giving up much of the internal space to stores.

American conditions are so different as to need a much greater variety of treatment, and in every section of the country house-boating is popular. House boats are abundant on the Pacific coast, and the Mississippi system is dotted with them wherever a great city forms the necessary social nucleus. On the St. Lawrence and Lakes George and Champlain they are a summer feature, and the neighborhood of New York is especially favorable to them. In the Florida waters are some of the largest ever built, as well as many of the humbler and truer kind.

House boats may be divided into three classes—those which simply float and are moved from place to place by towing, those which move from place to place under sail, and those which move under their own power. Consult A. B. Hunt, *House Boats and House Boating* (New York, 1905), F. W. and C. Hutchins, *Houseboating on a Colonial Waterway* (Boston, 1910), also various magazine articles, such as Lord, "How to Build a Houseboat for \$300," *Scientific American*, May 14, 1910, Wainstall, "A Commuter's House Boat," *Country Life in America*, May 1, 1911, White, "A Year-Round Houseboat," *Country Life in America*, Dec. 1, 1911.

HOUSEBOTE. In English law, the right of a tenant for life or years to take from the land sufficient timber to keep the buildings on the place in repair. Housebote belongs to the class of ancient tenant rights, dating back, it would seem, to the Anglo-Saxon period, now generally known as estovers. They constituted a class of exemptions from the law of waste which severely restricted the right of a tenant for life or years in his enjoyment of the lands held by him. These rights still exist in the United States as well as in England. See ESTOVER; LANDLORD AND TENANT, WASTE.

HOUSEBREAKING. See BURGLARY.

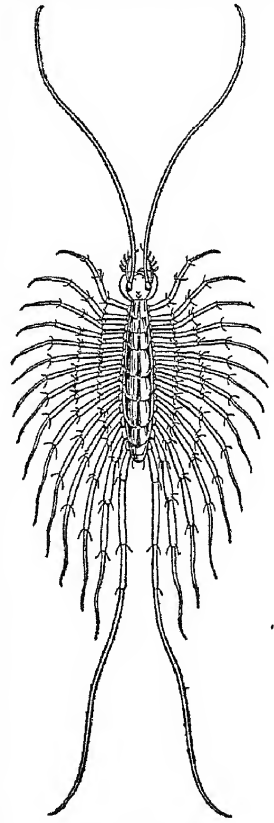
HOUSE CENTIPEDE. A myriapod with very long legs and long antennae, which is numerous in the Southern States and brightly colored. It haunts houses and is feared by ignorant persons as poisonous, but is harmless and really beneficial, as it feeds on small insect vermin. It is the only representative in the United States of the chilopodous family Cermatidae, and is named *Scutigera forcipes*. Consult Howard and Marlatt, *Principal Household Insects of the United States* (Washington, 1906). See MYRIAPODA.

HOUSE CRICKET. See CRICKET.

HOUSE FINCH, or LINNET. A small finch (*Carpodacus mexicanus frontalis*) very common throughout California, Arizona, and northern Mexico, and familiar in all valley towns and rural gardens, where it is welcome for its beautiful plumage and exceedingly sweet, canary-like song, heard throughout the year. It is related to and resembles the purple finch of the Eastern States,

but is smaller and tinner. The head and breast of the male are a rich red-wine color, varying from carmine to crimson, and the remainder of its plumage a mixture of reds, soft grays, and browns, the females and young have no red, and in winter the colors are less bright than in early summer. This finch makes its nest normally in trees, but now also occupies holes and crannies about houses and buildings, where it is never disturbed by the people, although much harassed by swallows in competition for desirable quarters. The eggs are pale blue, sparingly marked with dark lines and dots about the large end. Other names for this bird are adobe finch, red-headed linnet, and burnion. Consult Bergtold, "A Study of the House Finch," in *The Auk*, xxx (Cambridge, Mass., 1913).

HOUSE FLY (*Musca domestica* L.) An insect belonging zoologically to the order Diptera, or two-winged flies. It belongs to a very large group containing a number of families and species which closely resemble it in appearance. House flies breed and are found largely outside of houses, and conversely other flies of allied families are found within domiciles which are not the true *Musca domestica*. A true house fly is distinguished from the Sarcophagidae by having four black lines instead of three on the back of its thorax. The Tachinidae also possess four black lines, but they have the bristles of the antennae smooth, whereas the house fly has



HOUSE CENTIPEDE

them feathered. From the Anthomyiæ it is distinguished by a bent vein near the tip of the wing. In addition to this characteristic *Musca domestica* possesses no bristles on the abdomen except at the tip. The house fly breeds in fermenting organic matter, preference being given to horse manure, although the eggs will be deposited on the excreta of almost any animal. The larvæ have been found in decomposing garbage, vegetable waste, kitchen slops, decayed meat, animal hair, and chicken feathers, and even in snuff, but, most important of all, they are found in abundance upon human excreta, upon which the fly feeds as well as deposits its eggs. It is often referred to as the typhoid fly, its habits in the above respect favoring the dissemination of this disease. House flies have been accused by various observers with the dissemination of a long list of diseases, including cholera, dysentery, diphtheria, erysipelas, contagious ophthalmia, cerebrospinal meningitis, anthrax, and possibly smallpox. The evidence in regard to typhoid is conclusive. It is believed to be most active in spreading diarrheal affections, such as cholera morbus, dysentery, summer diarrhoea, paratyphoid and typhoid fever. Torrey in 1912 found, by observing the flies in New York City during the warm months, that they were only mildly infected with disease germs in the spring, but as the summer advanced the bacterial count steadily increased.

Life Cycle. Depending largely upon conditions of heat and moisture, the duration of the life cycle of the domestic fly varies from 10 to 15 days. According to Hewitt, the minimum rate of growth in the various stages is as follows: eggs, eight hours, the first larval stage, 20 hours, second larval stage, 24 hours, third larval stage, three days, pupa, three days, a total of eight days and four hours. The rate of generation based on the climatic conditions in Washington, D. C., assuming that all eggs survive, is astonishing. A single female laying 120 eggs on April 15 would have descendants by September 10 to the number of 5,598,720,000,000. This calculation is based only upon one batch of eggs, whereas there is a possibility of four such layings from a single fly. The house fly has a keen sense of smell, and its first impulse on issuing from the pupal inclosure is to seek warmth and food, it flies from its filth heap unerringly towards the nearest kitchen. It feeds on a variety of food and is apparently equally fond of the milk jug, the slop bucket, garbage can, or filth heap, passing freely from one to the other and distributing on its way many varieties of bacteria which cling to its feet. Its intestinal canal is comparatively simple, and pathogenic bacteria and other microorganisms pass unchanged through it and thus find another method for distribution. The digestive fluids are very weak, and the insect absorbs merely those substances which are readily soluble in them. Although the fly is capable of traveling at great speed and for long distances, Hewitt is of the opinion that normally they do not migrate very far from their place of origin. The facts in regard to the life history of the fly make it a comparatively simple matter to deal with the problem. Measures urged by boards of health throughout the country are to destroy all possible breeding places of the insect and to keep garbage cans and other refuse receptacles screened and to destroy by traps or otherwise all flies that can be

caught, particularly in the early part of the summer. The fly has many enemies. It is readily attacked by fungous and parasitic diseases, by certain microscopic protozoa, one species known as *Heptemonas musca domestica* being most active, nematode or thread, worms are active enemies. The mite called *Atomus parasiticum* attacks it. Besides these spiders of many varieties, the house centipede, the false scorpion, and ants may be mentioned among the natural enemies of the house fly. The common toad feeds upon flies and will catch enormous numbers. domestic poultry feed with avidity upon the larvæ, many lizards and a certain species of rat feed largely upon flies. Birds, on the other hand, play very little part in the destruction of this pest. Consult Hewitt, *The House-Fly. A Study of its Structure, Development, Bionomics, and Economy* (Manchester, England, 1910), id. *House Flies and How they Spread Disease* (New York 1912), L. O. Howard, *The House-Fly—Disease Carrier* (ib., 1911), and references there given, id., *House Flies* (Washington, 1911), C. V. Chapin, *The Source and Modes of Infection* (New York, 1912), W. E. Britton, *House Fly as a Disease Carrier and How Controlled* (Hartford, Conn., 1912), E. H. Ross, *Reduction of Domestic Flies* (Philadelphia, 1913). See also FLY, INSECTS, PROPAGATION OF DISEASE BY.

HOUSEHOLD, ROYAL (of Great Britain)

The personal attendants upon the reigning sovereign. Among all primitive Germanic peoples we find such attendants. The chief officers of the household are usually four in number: the steward, who is the head of the household, the marshal, or head of the royal stables, the cup-bearer, and the chamberlain, who has charge of the King's chambers. These four officers are found among the Anglo-Saxons and at the court of the Norman dukes. As the royal power developed, the household attendants became officers of state, and the King's household is his ministry. Under the Norman kings of England the royal household consisted of two sets of officers, whose functions greatly resembled each other. Foremost among them was the justiciar, the King's chief adviser and his representative in England when the King was abroad. The steward, whose most important functions of state passed over to the justiciar, remained head of the royal household. Other members were the treasurer, who had charge of the King's treasury, and the chamberlain, who audited the accounts, the constable, a sort of quartermaster-general of the court and the army, who had a seat in the exchequer, and the marshal, whose functions were similar. Some of these officers, viz., the steward, the constable, butler, and marshal, were hereditary in the great Norman families and either lost their importance or became merely household officers. Others which were appointed, like the justiciar, chancellor, and treasurer, became the important officers of state.

In the present organization of the royal household the lord steward is the chief officer. His authority extends over the treasurer, the controller, and the master of the household, and over all the other household officers and servants except those of the chapel, the chamber, and the stable. The dean and the subdean are the principal officers of the chapel, which is composed of a number of clerks and chaplains. The lord chamberlain controls the officers and servants of the royal chambers and appoints the trades-

men who are purveyors to the sovereign. The master of the horse is in charge of the royal stables and has under his charge the master of the hounds, the grand falconer, the crown equerry, and other servants. In the court of a female sovereign the ladies of the household play an important part. The mistress of the robes is the head of this department, and under her are the ladies of the bedchamber, maids of honor, and other attendants. The ladies of the bedchamber are the personal attendants of the Queen. Besides these there are a large number of physicians, surgeons, apothecaries, druggists, and dentists in attendance. The other members of the royal family have similar households, but on a much smaller scale.

The expenses connected with the royal household have varied greatly in the different periods of English history. In the Middle Ages the King was always attended by a large following of lords, both spiritual and temporal, besides knights, esquires, and other inferior attendants. He obtained provisions for his court by exercising the right of purveyance (*qv*), which has been abolished. Notwithstanding this, the expenses of the royal household often proved a burden to Parliament, which sometimes regulated them. This was most carefully done in the *Household Book* of Edward IV, which rigorously defined the officers of the household and the duties of its members. The expenses of the household of Edward IV were £13,000 a year, which may be taken as a fair average sum for the household expenses of a king during that period. Since the accession of William III Parliament has fixed the amount of the appropriation at the beginning of each reign. Queen Victoria received an allowance of £385,000 a year, distributed as follows: privy purse, £60,000, household salaries and retired allowances, £181,260, household expenses, £172,500, royal bounty, arms and special services, £18,200, leaving an unappropriated balance of £8040, to be used at discretion. The Prince of Wales received an annuity of £40,000 over and above his other revenues, the Duke of Connaught £25,000, and the other members of the royal family in proportion to their rank. By a grant of May 9, 1901, Parliament increased the Civil List to £415,000, the King's privy purse being increased to £110,000. See CIVIL LIST.

Consult *The Ordinances and Regulations for the Government of the Royal Household*, published by the Society of Antiquaries (London, 1790); Larson, *The King's Household in England before the Norman Conquest* (Madison, 1904); Round, *The King's Sergeants and Officers of State* (London, 1911).

HOUSEHOLD ECONOMICS. See HOME ECONOMICS.

HOUSEHOLD GODS (Lat. *di familiares*, or *di domestici*). Among the ancient Romans, the divinities supposed to watch over the house and the family. Thus, Vesta (*qv*) was the goddess of the hearth and guardian of domestic unity. But the name was applied especially to the *lares* (*qv*) and the *penates* (*qv*).

HOUSEHOLD SUFFRAGE. The form of the parliamentary franchise at present in force in Great Britain. It was established in the boroughs by the Reform Bill of 1867-68, which conferred the right of voting for members of Parliament on all adult male household owners or lodgers who were the occupants of a dwelling capable of bringing in a yearly rental of £10

and over. By the Franchise Bill of 1884 the right was extended to the inhabitants of the counties who possessed the same qualifications.

HOUSEHOLD TROOPS. Specifically, the term applies to those regiments of the British army which form the permanent garrison of the city of London, and whose especial duty it is to attend the sovereign. Details from these troops mount guard over the royal residences and important public buildings and institutions. The term includes the following troops: two regiments of the Life Guards (First and Second), the Royal Horse Guards, the first, second, and third battalions of Grenadier Guards, the first and second battalions of Coldstream Guards, the first and second battalions of Scots Guards, and the Irish Guards. The term "household troops" is frequently used by English and American writers to describe the élite regiments of Germany and other monarchical countries.

HOUSEHOLD WORDS. A weekly periodical, founded March 30, 1849, by Charles Dickens, who became its chief editor. The opening numbers contained a serial story by Mrs Gaskell *Hard Times*, and many of Dickens's minor stories, first appeared in it. It was discontinued in 1858 and was succeeded by *All the Year Round* (April 30, 1859).

HOUSE INDUSTRY. A form of industrial organization in which the workman labors at home for a manufacturer or contractor. It is to be contrasted, on the one hand, with the artisan organization of industry in which the master craftsman was his own business manager and produced for the needs of a local market and, on the other, with the factory organization with its groups of workmen cooperating under a common direction and division of labor. Historically it forms a transition from the former to the latter. It was the outgrowth of a widening market for goods and marked a change in the mercantile organization of industry which kept pace with and in many cases outstripped its technical progress. As a dominant form of organization, it marked especially the closing years of the eighteenth and early years of the nineteenth centuries, and while it still lingers in backward regions and even grows up anew under peculiarly favorable circumstances, it is in the main a thing of the past.

The characteristics of the system are the isolation of the worker's production by the crude processes of hand labor and the marketing of the product by third persons. The workman may in the first instance supply his materials, but the need of uniformity in the product soon brings it about that the latter are supplied to him, and he is paid at piece rates for the work he does upon them.

Such an organization can compete with factories only when the technical processes of production remain comparatively primitive. When complicated machinery and minute subdivision of labor are introduced into factory work, house industry is doomed. It has under such circumstances kept up for a time an unequal struggle in which long hours of labor and the assistance of the entire family marked the labor in the homes. Bad as were the conditions in the factories of England in the early part of the last century, their misery was exceeded by that of the poor hand workers with whom the factories competed.

The modern counterpart of house industry in

Great Britain and America is found in the sweating system. This system is most extensively employed in the garment trade, in which the mercantile transformation was later than in other lines of industry, and in which the relative scope of hand labor as compared with use of machines is very large. The textile industries and the manufacture of boots and shoes both passed through this stage. While spinning machines and power looms were yet primitive, the hand workers were able to maintain themselves for a while by working for others. In New England the factory system had its beginnings in the domestic occupations of the people. Throughout northeastern Massachusetts may still be seen about the farms ruins of small workshops where during the winter the farmers made shoes for the merchants of Lynn and Boston. Elsewhere in the State straw for the manufacture of hats was plaited by the women on the farms, and by men in the winter time. In Sweden and Russia such industrial occupation among the rural population is quite frequent. In central Europe house industry is far more extensive. The hilly region of central Germany, from the Thuringian to the Silesian mountains, is its peculiar home. See SWEATING SYSTEM.

HOUSE/LEEK', or LIVE-FOREVER (*Sempevivum*). A genus of plants of the family Crassulaceæ, the members of which have succulent leaves which generally form close rosettes. The common houseleek, or cyphel (*Sempevivum tectorum*), grows wild on the rocks of the Alps, but has long been common in almost every part of Europe, planted on walls, roofs of cottages, etc. It sends up leafy flowering stems of 6 to 12 inches in height, which bear branches of pale-red statelike flowers, equally curious and beautiful. The leaves, cut or bruised and applied to burns, insect stings, ulcers, and inflamed sores, afford immediate relief. They were formerly in high esteem as a remedy for fevers and other diseases, and an edict of Charlemagne contributed greatly to the extensive distribution of the plant. Other species possess similar properties. *Sempevivum globiferum*, with yellowish-green flowers, is very frequently planted on walls in Germany. Some of the species, natives of the south of Europe, the Canary Isles, etc., are shrubby, others are common greenhouse plants.

HOUSE/MAID'S KNEE. A term commonly applied to an acute inflammation of the bursa, or sac that intervenes between the patella, or kneecap, and the skin. Housemaids are especially liable to it from their kneeling on hard surfaces. It causes considerable pain, swelling, and febrile disturbance. The only disease for which it can be mistaken is acute inflammation of the synovial membrane lining the cavity of the joint, but in this disease the patella is thrown forward, and the swelling is at the sides, while in housemaid's knee the swelling is very superficial and is in front of the patella. The treatment consists essentially in the employment of rest, cold applications, and bandaging. Where the condition has become chronic, radical relief can be secured by the excision of the bursa or the injection of iodine. If suppuration occurs, the sac must be opened and the pus evacuated.

HOUSE MARTIN. See HOUSE SWALLOW.

HOUSE OF COMMONS. See GREAT BRITAIN, Government, PARLIAMENT.

HOUSE OF CORRECTION. See REFORMATORIES.

HOUSE OF FAME, THE. A poem by Chaucer, in three books, probably written in 1384. The influence of Dante is evident in the construction of the poem.

HOUSE OF KEYS. See MAN, ISLE OF.

HOUSE OF LIFE, THE. A century of sonnets by Dante Gabriel Rossetti, published among the *Ballads and Sonnets* in 1881. Some of the poems were reprints from the *Poems* of 1870.

HOUSE OF LORDS. See GREAT BRITAIN, Government, LORDS, HOUSE OF.

HOUSE OF THE FAUN (It *Casa del Fauno*). One of the largest and finest houses of Pompeii, famous for its sumptuous decorations. In it was discovered the statue of the "Dancing Faun," from which the house received its name. Its mosaics are the most beautiful that have been preserved to the present day. Among them, occupying the floor of the exedra, was discovered the celebrated mosaic of the Battle of Issus, showing Darius fleeing from Alexander, now in the Naples Museum, where the other mosaics belonging to the House of the Faun are also preserved. These include a representation of the creatures of the Nile, which formed the threshold to the Battle of Issus, the Genius of Autumn riding on a panther, doves pulling a necklace out of a jewel box, and other compositions.

HOUSE OF THE SEVEN GABLES, THE. A novel by Nathaniel Hawthorne, published in 1851. It is the story of a decayed New England family and deals with the heritage of evil which has been passed down to an inoffensive generation.

HOUSE SNAKE. See MILK SNAKE, MOCASIN SNAKE.

HOUSE, or "ENGLISH," SPARROW. This typical sparrow (*Passer domesticus*) is the most familiar fringilline bird of Europe and latterly of the whole civilized world. It is indigenous to Europe and in closely related subspecies to Asia, where it is only partly migratory and a constant attendant upon mankind. It was not known south of the Sahara, nor in Australasia, until the European colonization of those regions caused its introduction there, and since 1850 it has become a resident of both North and South America. Everywhere it flourishes, increases with amazing rapidity, and impresses itself upon the locality by its adaptability and pugnacity towards native birds. From the earliest times it has associated fearlessly with mankind and has been a denizen of towns more than of the country. This characteristic is most prominent in the new countries, where it clings at first to cities and later spreads along railroads and other highways to the interior towns. It remains everywhere a town bird, rarely visiting and never nesting in the wilderness. To this urban habit are due in large measure its extraordinary hardihood and prolificacy, for in town it can always find an abundance of food in the streets or about warehouses, railroads, etc. Consequently it is nearly independent of season in breeding and may rear several broods a year, moreover, its nests and fledglings are safe against nearly all the enemies and dangers which beset the lives of wild birds. The result is a longevity and a rapidity of multiplication which may speedily render the species a serious local nuisance. This is felt in the more populous parts of the Old World as

well as in the countries to which it has been transplanted and where it flourishes with aggressive vigor

While the sparrow seems able to eat all sorts of food, it is naturally graminivorous, and only when young or in feeding its young does this species consume insects in any considerable quantity. Its services to agriculture in this way are so limited in time and amount that they are insignificant, and more than overbalanced by its incessant attacks upon the smaller insect-eating birds, which otherwise would come freely about villages, orchards, and farmhouses. In the United States it has greatly lessened the number of such birds in some localities or at any rate has driven them away from villages and farmsteads—particularly bluebirds, wrens, and all sorts of swallows, whose nests it destroys or appropriates, but there is reason to believe that the native birds are learning more and more how to cope with this bandit. Moreover, in some districts, besides great destruction wrought to the buds of fruit trees, the sparrows annually migrate in summer in large companies to the grainfields and devour or shake down quantities of ripening grain. A third evil attributed to this bird is the spread of disease due to its propensity for using feathers and rags in the construction of the nest and for placing this nest upon or as near as possible to the house, since it may and frequently does gather these materials from infected clothing or bedding thrown out of sick rooms.

Introduction into America. The house sparrow was first brought to the United States from England in 1850 by Nicholas Pike and other directors of the Brooklyn Institute, when eight pairs were liberated in Brooklyn, N. Y., but a second importation in 1853 was needed to establish the race. Sparrows were brought in and colonized elsewhere during the next 20 years, in various parts of the country, including California, the city government of Philadelphia importing and letting loose in that city over 1000 pairs in 1869. The motive in most cases was to free the shade trees of devastating caterpillars, which about that time were especially numerous and annoying throughout the Eastern States. A few far-seeing persons protested, but were not listened to. Only a few years elapsed, however, before a mass of evidence was presented that the sparrows were of no practical service as insect destroyers and were an increasing nuisance and menace. The outcome of much discussion and writing was an exhaustive inquiry, conducted by the United States Department of Agriculture, the results of which, unfavorable to the bird, were published in 1889 in *Bulletin No. 1* of the Department, a document of 400 pages. Whether, as many believe, a balance will after a time be obtained, and these imported sparrows cease to be relatively more numerous and troublesome than native birds of the same nature, remains to be seen. The fact that the people of Great Britain make the same complaint as those of the United States against their prolificacy and destructiveness discourages this expectation.

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HOUSE SWALLOW, or **HOUSE MARTIN.** The English name of the familiar European swallow (*Hirundo*, or *Chelidon, rustica*), which makes its mud nest about houses and barns, more often than otherwise in the interstices of farmhouse chimneys, so that it is also called chimney swallow (qv). It is widely distributed throughout the Old World and everywhere a familiar of civilization. See SWALLOW, and Plate of SWALLOWS.

HOUSE TAX. The duty laid on inhabited houses in Great Britain. This tax was first imposed by Act of Parliament in 1778 (18 Geo. III, c. 26) and was suggested by Adam Smith, in his *Wealth of Nations*, as a substitute for the unequal and obnoxious window tax which had been imposed on householders since 1696. The house tax has been continuously collected since, except for a brief period (1834-51) when it was suspended. It differs from the real-property tax, which is the universal basis of direct taxation in the United States, in two respects, viz, it is levied on the legal occupier and not on the owner of the premises, and it is based, not on the value of the real estate, but on the rental value of the house. Houses used exclusively for trade or other business purposes, houses that have a rental value of less than £20 per annum, unoccupied houses, and charity hospitals, charity schools, etc., are exempt from the tax. The question as to what is and what is not a house for the purposes of the act has given rise to much litigation. The results that have been reached betray some singular inconsistencies. Thus, it has been held that where a dwelling house is let in different stories, tenements, or lodgings to different people, it is to be charged as one house but, on the other hand, each set of chambers in the Inns of Court and each set of rooms in the colleges or halls of any university is treated as a separate house. See TAX, TAXATION.

HOUSE THAT JACK BUILT, THE. A nursery rhyme in *Mother Goose*. It relies for its interest on the accumulative manner in which it is told. Hallowell conjectures that its original was a Chaldean hymn or fable, in *Sepher Haggadah*, which is strikingly like the rhyme of *The Old Woman and the Crooked Shapence*.

HOUSING PROBLEM. The concentration of population in cities, resulting from the progress of modern industrialism, has given rise to serious evils connected with the housing of the poor. Scarcity of accommodations, coupled with high rents, has resulted in a degree of overcrowding and an exploitation of cheap and obsolete dwellings that threaten the physical and moral health of the working class.

The housing problem presents various aspects according to local conditions. In American cities, especially in New York, its chief feature consists in undue aggregation of population upon a limited area of ground, with the resultant tendency to occupy as much of the building space as possible with lofty structures, thus depriving the tenants of adequate light and air. In European cities, on the other hand, where building operations have been less active, the evil is manifested in the form of occupancy by several persons of apartments designed for one, with consequent menace to health and morals.

Previous to the nineteenth century little at-

tention was paid to the homes of the common people. The poor of the rural districts were generally housed in wretched hovels, but this, like the state of poverty, was assumed to be natural. Sporadic attempts to provide housing for certain limited classes have, indeed, been recorded. In the early seventeenth century Christian IV of Denmark erected what would then have been considered model dwellings for sailors of the royal navy, and a Portuguese noble founded at Lisbon, after the earthquake of 1759, a "workingmen's city," some vestiges of which still remain.

With the appearance of large industrial establishments in the nineteenth century, the housing problem became acute. Villages adjacent to the new factories were unable to provide satisfactorily for the influx of workers. The owners of factories were forced to erect buildings to house their workers. An early example of this kind of enterprise was the workmen's village erected by Legrand, a coal-mine owner, at Mons, Belgium, in 1818. The plan was widely adopted by employers and quickly degenerated into an auxiliary means of profit, the cheapest and most unsanitary cottages being provided at the highest possible charges. In 1833 another Belgian employer established at Verviers what may be considered one of the earliest model factory villages. Forty-three cottages, each with its garden, were erected at a cost of 100,000 francs. After 1850 the model factory village began to make its sporadic appearance in other countries as well. Much more frequent, however, was the appearance of the factory village designed to extract from the worker in rent as much as possible of his wages in return for accommodations unfit for habitation. Of the model village type are the Krupp villages (see KRUPP FOUNDRIES, SOCIAL WORK AT), erected to house the workers in the Krupp works at Essen, the buildings of Lever Brothers, Birkenhead, England, and the Pullman cottages at Pullman, Ill. (see PULLMAN). Other instances of the same type are numerous in all industrial states. They appear, as a rule, where a single powerful company occupies a dominating position in a small community. Necessity drives the employer to erect workmen's dwellings, and interest in a healthy and contented working force, as well as philanthropy, leads to an endeavor to supply the best practicable accommodations. Where stress of competition or the presence of a great body of low-standard labor intervenes, the same condition may produce some of the most frightful cases of overcrowding and sanitary neglect. The unsanitary factory village affords a problem still far from solution.

The housing problem at present most prominent in the public mind concerns overcrowding in the great cities. The problem is coextensive with modern industry. Investigations carried on in New York, Chicago, Berlin, London, Paris, and Stockholm tell the same story of a working population overcrowded in houses and tenements, with resultant weakening of health, prevalence of infectious diseases, and moral decay. In the United States the problem first assumed acute form in New York City. Agitation for public control of housing in New York began with a report by Dr. James H. Griscom, inspector of the board of health, submitted in 1842. No action was taken until 1864, when a council of hygiene and public health was organized. In

1867 the first law on the subject of tenements was enacted. Its provisions were hopelessly inadequate, and builders were practically free to follow their own devices until the Law of 1901 was enacted, after a prolonged agitation in which the most prominent part was taken by Jacob Riis (qv). This law, improved by successive amendments and efficiently enforced, has done much towards improving housing conditions in New York. It has not been possible to overcome all the worst consequences of the earlier period of license. As late as 1910 there were in New York City 1000 'dumb-bell' tenements, 20,000 houses in which most of the rooms were dark, 100,000 rooms without windows, and 1,000,000 persons with no facilities for baths in their homes. None the less the condition of the tenements has been notably improved. To this improvement must, at least in part, be credited the decline in the death rate from 20 per thousand in 1900 to less than 14 per thousand in 1914.

The regulation of housing in other cities received a great impetus from the New York Law of 1901. In 1904 a similar law was enacted in New Jersey, and by 1912 such laws had been enacted in six other States, applying for the most part only to large cities. In 1913, 82 cities in the United States and five in Canada had housing regulations in force.

American housing regulations include, as a rule, restrictions upon the percentage of lot area that may be covered by a building, requirements as to cubic content of each room intended for occupation and as to light and air, regulations as to plumbing, provision of safeguards against fire, such as the specification of fireproof or slow-burning materials for buildings above a given height, noncombustible stairways, fire escapes, etc. Such regulations may be enforced through the regular police, through a board of health, or through a special administrative organ like the Tenement House Commission of New York. The last method is essential to effectiveness.

In the case of buildings in existence at the time of the enactment of housing laws it is possible to make only limited improvements. On grounds of public safety and health an energetic administrative board can impose certain improvements, such as the provision of fire escapes, the cutting of windows in dark rooms, and the installation of proper plumbing. The serious evils of overbuilding in respect to area of lot and of improper construction cannot thus be reached.

The public regulation of housing in Great Britain began with the Act of 1875. Additional measures were enacted at almost every session of Parliament. At present the subject is regulated by the Public Health Acts of 1875 and 1891, the Housing of the Working Classes Act of 1890, amended in 1894, 1900, and 1903, and the Housing and Town Planning Act of 1909. The Public Health Act requires the local authorities to provide appropriate inspection of houses. The Housing Acts authorize the local governing bodies to demolish unsanitary buildings and to construct habitations for the working classes, or to encourage private enterprise in this work. Under this provision several cities have carried through extensive projects for the reclamation of slum areas. Unfit habitations have been demolished, and their places taken in some cases by open spaces and thor-

oughfares, in others by model tenements erected by the city and leased to working-class families. As compared with the American plan of exclusive reliance upon restrictions on private builders and owners, the British plan presents certain obvious advantages. A thorough reconstruction of an unsanitary quarter is possible under the latter plan, but not under the former. The results of the British plan have not, however, been wholly favorable. It has placed heavy burdens upon the city treasury, at the same time, since the city-built tenements occupy less ground area than the old tenements demolished and consequently house fewer persons, the process has resulted in an aggravation of overcrowding in adjacent tenement districts.

Serious attention has long been given to the housing problem in Germany. Restrictive measures of great minuteness, severely enforced, characterize most of the larger cities. The cities, like those of England, have authority to acquire real property, to demolish old buildings and erect new, or to encourage private enterprise in the provision of housing. In general, the policy of German cities has been not so much to reconstruct areas already developed as to develop new centres. While the municipalities frequently erect apartment houses and cottages at public expense, either to let or for sale, the prevailing method is to encourage cooperative societies or private individuals to erect buildings under appropriate restrictions. This encouragement takes the form of building loans from public or semipublic funds, such as municipal savings and public insurance funds. Rates on such loans are low, and provision is made for the gradual amortization of the loan through small additions to the interest payments.

Methods similar to the German are employed in Scandinavia, Austria-Hungary, and Italy. In this connection should be noted the Belgian plan of providing workingmen's trains, enabling the workers from the city to remove their residences to distant suburbs, where land is cheap. Coupled with provision for loans at low interest of semipublic funds, the workingmen's trains have given Belgium a far larger proportion of wholesome semirural dwellings than was to have been expected from its position as one of the most highly industrialized of modern nations.

Much attention has been given to private efforts to contribute to the solution of the housing problem. Two methods have been in vogue—one purely philanthropic, the other a combination of sound business and philanthropy. An early instance of the philanthropic method was the project of Octavia Hill, undertaken in 1864, with the financial support of John Ruskin. The plan was to secure unsanitary property by purchase, employ the sums received in rent to improve it, and eventually to use the funds thus accumulated to erect new and better buildings. The plan involved both improvement in the property and in the standard of housing of the tenant population. Similar methods have been employed sporadically in many cities of America and Europe. While they provide improved housing for a few, their effectiveness is limited to the original funds, which, since they are managed without a view to profit, are apt to become dissipated in time through some miscalculation.

The plan involving both philanthropy and business principles has had far greater success.

It is a well-known fact that much of the very worst tenement property, though ill adapted to its use, pays very high profits on the capital invested. Accordingly there would appear to be good reason for the belief that an enterprise operating on a considerable scale, erecting buildings with the utmost economy consistent with the requirements of comfort and sanitation, and limiting itself to a moderate scale of profits, could furnish good habitations as cheaply as, or even at a lower rate than, the owners of unsanitary shacks can furnish such habitations as they have. It is upon this principle that the most successful model housing projects have been based. Among these may be mentioned in England, the Metropolitan Association for Improving the Dwellings of the Industrious Classes (1841), which owns 14 estates in London and pays $4\frac{1}{2}$ per cent, the Peabody Donation Fund, which owns enormous blocks of tenements, the Improved Industrial Dwellings Company of London, founded by Sir Sidney Waterlow as the result of a successful experiment (1862), which endeavors to combine beauty and utility in large blocks, the Guinness Trust. In 1899 the Garden City Association, later organized as the Garden City Pioneer Company, Limited, was formed to provide suburban homes, with spaces reserved for gardening, for the city population. On the continent of Europe are the Berlin Mutual Building Company (1849) and other commercial and semiphilanthropic companies in different cities. In the United States A. T. White founded the Improved Dwelling Company of Brooklyn (1876), which has erected the Home Tower and Riverside buildings, the older buildings paying 10 per cent, the new buildings 5 or 6 per cent. Other New York enterprises are the Astral Apartments (Brooklyn) of Pratt Institute, Improved Dwellings Association, with model tenements at Seventy-first Street, paying 5 per cent, Tenement House Building Company, with property on Cherry Street. In Boston are the Harrison Avenue Estate, the Rufus Ellis Memorial Building, Cooperative Building Company (1871), and the Improved Dwelling Association (1885). In Philadelphia is the Theodore Starr Property. The City and Suburban Company of New York City was organized in 1896 as the outcome of the Improved Housing Conference. It aims to offer a safe investment returning 5 per cent and to provide the best accommodations for working people.

Under this head the most striking development is the Garden City movement, which seeks to solve the housing problem by removing city workers to suburban areas. By acquiring large tracts of land remote from the path of city development and providing adequate transportation facilities, all the benefits that would ordinarily accrue to the speculative landowner from improvements may be reserved to the occupier of the land. Model dwellings may be erected in adequate spaces and leased or sold to city workers at prices which, while affording a fair profit, are none the less much lower than those prevailing in the city. The Garden City movement is the outgrowth of Ebenezer Howard's book, *Garden Cities of Tomorrow*, published in 1898. In 1902 the Garden City Pioneer Company was organized. In 1904 the company purchased 3500 acres of land at Letchworth, 34 miles northwest of London. The land was laid out in small parcels by experts; two-thirds of

e land was retained in small farms. The number of houses that could be erected on one acre was limited to 12. Returns from the enterprise were limited to 5 per cent on the investment. The population resident in the Garden City exceeded 7500 in 1912. Enterprises of a similar character, but with the philanthropic element predominant, are Bournville and Portlough. The Garden City movement has aroused great interest in Germany. In 1909 the garden city of Hellerau, just outside of Dresden, was founded. One hundred and fifty cottages were erected in the first year of its existence, and as many the second year. The cottages are erected by cooperative building societies and are rented to members of the societies at from \$62 \$150 annually. Similar suburban garden cities have been founded at Karlsruhe, Nuremberg, and Munich. An American example of the movement is the community established at Forest Hills, L. I., by the Russell Sage Foundation.

Important as philanthropic efforts at housing reform really are, it is easy to exaggerate their influence upon the general housing situation according to estimates of Veiller, in the years 1902-1908, 25 groups of tenements, accommodating 3588 families, were erected in New York under philanthropic auspices. 27,100 tenement houses, accommodating 253,510 families, were erected by speculative builders. In the years 1902-08 the philanthropic enterprises provided accommodations for 1871 families, while speculative enterprise provided for 253,235 families. It is obvious that even a slight improvement, imposed by public authority upon the mass of speculative builders, may contribute more to the solution of the general housing problem than the aggregate of philanthropic endeavor. American students of the housing problem accordingly concentrate their efforts upon improving the housing regulations and securing their efficient administration.

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York, 1911), id., *A Model Housing Law* (ib., 1914), National Housing Association, *Publications*, I-XIII (ib., 1910-11). See TENEMENT-HOUSE PROBLEM. LODGING HOUSES, STANDARD OF LIVING. MUNICIPAL REFORM.

HOUSMAN, ALFRED EDWARD (1859-) An English Latin scholar, an elder brother of Laurence Housman. He was educated at St John's College, Oxford, was a division clerk in the Patent Office in 1882-92, and, after being professor of Latin at University College, London, from 1892 to 1911, was made professor of Latin at Cambridge and fellow of Trinity College. He wrote *A Shropshire Lad* (1896, music by C. F. Manney 1914) and edited two books of Manilius (1903 and 1912) and selections from Juvenal (1905), besides publishing articles in classical periodicals.

HOUSMAN, LAURENCE (1867-) An English illustrator and author, brother of Alfred Edward Housman (qv). He began his career, after studying art at South Kensington, as a book illustrator, working somewhat in the Pre-Raphaelite tradition, in which capacity he is seen to advantage in his designs for Meredith's *Jump to Glory Jane* (1892), Christina Rossetti's *Goblin Market* (1893), *Werewolf* by his sister, Clemence Housman—who engraved his designs on wood—and Shelley's *Sensitive Plant* (1898). As a poet, one thinks of him in connection with Rossetti, whose influence is felt in his mysticism and in the technique of his verse, as will be seen in such representative poems as those collected in *Spikenard* (1898), *Mendicant Rhymes* (1906), and in *Selected Poems* (1909). As a writer of tales of a symbolical and allegorical cast, he is perhaps at his best in *All Fellows* (1896), *The Blue Moon* (1904), and *The Cloak of Friendship* (1905), as a biting if cheerful satirist, in story form, of the England of his day, in *John of Ingallow* (1912), and as a novelist, in the finely written *An Englishwoman's Love Letters* (1900), in *A Modern Antæus* (1901), and in *Sabrina Warham* (1904), probably his strongest novel. His *The Royal Runaway* appeared in 1913. In 1902 his *Bethlehem*, an attempt to recapture the homely, naïve piety of the old miracle play, was performed in London. Other dramatic pieces of his are the modern paraphrase of *Lysistrata* (1910) and the quaint and engaging *Prunella, or Love in a Dutch Garden* (1911, 1914), written in collaboration with Granville Barker, and played in London in 1904 and in New York in 1913. Housman identified himself actively with the militant suffrage movement.

HOUSSA. See HAUSA STATES.

HOUSSAYE, JOSÉ, ARSÈNE (1815-96). A French author, born at Bruyères. His real name was Housset. He went to Paris at an early age and at 21 became widely known as the author of two romances, *La couronne de bluets* and *La pécheresse*. He attracted attention particularly as an art critic, publishing his *Histoire de la peinture flamande et hollandaise* in 1846. In 1849 Houssaye was appointed director of the Comédie Française, at the suggestion of Rachel, and held the place until 1859. He was long editor of *L'Artiste* and for some years was editor and proprietor of *La Presse*. Among his works are, in addition to those already named *Mlle de la Vallière et Mme. de Montespan* (1860) and *Galerie de portraits du XVIIIe siècle* (1844), historical studies, *Le roi Voltaire* (1858) and the well-known and

entertaining *Histoire du quarante et unieme fauteur de l'academie française* (1855), both volumes of literary criticism, his play, *Comédiennes* (1857); *Symphonie des vingt ans* (1867) and *Cent et un sonnets* (1873), poems, *Les filles d'Ève* (1852) and other novels. Consult his *Confessions* (4 vols, Paris, 1885-91), and Ernest Lemaitre, *Jérôme Houssaye Notes et souvenirs* (Rheims, 1897), which latter contains a good bibliography.

HOUSSAYE, HENRY (1848-1911) A French historian and critic, born in Paris. He distinguished himself in the Franco-Prussian War and was subsequently an editor of the *Journal des Débats* and the *Revue des Deux Mondes*. His *Histoire d'Alcibiade et de la république athénienne depuis la mort de Périclès jusqu'à l'avènement des trente tyrans* (1873) received from the French Academy the prize established by Thiers. In 1894 he was elected to the Academy. His further works include *Histoire d'Appelles* (1867), *L'Armée dans la Grèce antique* (1867), *Athènes, Rome, Paris* (1879), *L'Art français depuis dix ans* (1882), *Aspasie, Cléopâtre, Théodora* (4th ed, 1890). He made a careful study from the original documents of the fall of Napoleon and of the First French Empire. The results are embodied in two works of the first importance. 1814, *Histoire de la campagne de France et de la chute de l'empire* (1888), which went through some 46 editions, and 1815, comprising three parts, of which *La première restauration, le retour de l'île d'Elbe, les cent jours* appeared in 1893, *Waterloo* in 1899, and *La seconde restauration, la ténacité blanche* in 1905. In 1903 he published *Napoléon homme de guerre*. He was an Officer of the Legion of Honor and an honorary president of the Society of Men of Letters. Consult Louis Sanolet, *Henri Houssaye Biographie critique avec notes et bibliographie* (Paris, 1905).

HOUSTON, hū'stən A city and the county seat of Harris Co., Tex., on Houston Ship Channel, an arm of Galveston Bay, at the head of navigation, 48 miles northwest of Galveston, on the International and Great Northern, the Gulf, Colorado, and Santa Fe, the Texas and New Orleans, the Missouri, Kansas, and Texas, the Houston and Texas Central, and several other railroads (Map Texas, E 5). It is a railroad centre of great importance, and improvements on the channel by the Federal government at a cost of \$2,500,000 have added to its transportation facilities by giving direct water communication with the Gulf of Mexico and the Atlantic Ocean, while local transit is facilitated by several bridges across the channel. The area of the city, which was about 16 square miles, was increased by annexation in 1914 to over twice that amount. It has the Houston Lyceum and Carnegie libraries and a large city hospital. Other prominent structures include the municipal auditorium (costing \$400,000), the new South End Junior High School (\$1,000,000), Union Station (\$5,000,000), the United States government building, the city hall, the courthouse, the cotton exchange and market, and the Masonic Temple. The William M. Rice Polytechnical Institute (coeducational), endowed with the estate of the founder, amounting to \$10,000,000, is situated in Houston. The city controls extensive commercial and financial interests; it is one of the most important cotton markets in the United States, and in its lumber trade ranks with the leading cities of the South-

west. Cottonseed oil, rice, and sugar are also exported, and a large general trade contributes to the city's prosperity. There are extensive railroad car and machine shops, cotton compresses and oil mills, planing mills, foundries and machine shops, rolling mills, potteries, brick and tile works, flour mills, carriage and wagon shops, etc. Iron and lignite are found in the vicinity. The government, under a charter of 1905, is vested in a municipal commission, consisting of a mayor and four commissioners, chosen from the city at large every two years. The water works are owned by the municipality. Houston spends annually in maintenance and operation \$2,717,000, the principal items of expenditure being \$430,000 for schools, \$172,000 for the street department, \$171,000 for the fire department, \$193,000 for the police department (including amounts for courts, jails, reformatories, etc.), \$135,000 for maintenance of water works, and \$63,000 for the health department (including amounts for charitable institutions). Houston was laid out and settled in 1836, was named in honor of Gen. Sam Houston, and in 1837-39 and 1842 was capital of the Republic of Texas. Pop., 1890, 27,557, 1900, 44,633, 1910, 78,800, 1914 (U. S. est.), 93,122.

HOUSTON, DAVID FRANKLIN (1866-). An American public official, born at Monroe, Union Co., N. C. He graduated from South Carolina College in 1887 and from Harvard University (A. M.) in 1892, and received the honorary degree of LL. D. from Tulane (1903), the University of Wisconsin (1906), Yale (1913), and Harvard (1914). He taught ancient languages at South Carolina College in 1887-88, was superintendent of Schools at Spartanburg, S. C., in 1888-91, and served as adjunct professor (1894-97), associate professor (1897-1900), and professor of political science (1900-02) at the University of Texas, where he was also dean of the faculty (1899-1902) and president in 1905-08. In 1902-05 he was president of the Agricultural and Mechanical College of Texas, and he served as chancellor of Washington University, St. Louis, from 1908 until his appointment in 1913 as Secretary of Agriculture in President Wilson's cabinet. He became vice president of the American Economic Association in 1914. He published *A Critical Study of Nullification in South Carolina* (1896).

HOUSTON, EDWIN JAMES (1847-1914). An American electrical engineer, born at Alexandria, Va. He graduated from the Central High School, Philadelphia, where he afterward taught physical geography and natural philosophy. In Philadelphia, also, he was professor of physics at Franklin Institute and at the Medico-Chirurgical College. He was one of the inventors of the Thomson-Houston system of arc lighting, was a member of the United States Electrical Commission, and was chief electrician of the International Electrical Exposition at Philadelphia in 1884. In 1893-95 he served as president of the American Institute of Electrical Engineers. His publications include *Elements of Physical Geography* (1878, 9th ed., 1909), *Dictionary of Electrical Word Terms and Phrases* (1889; 4th ed., 1898), *Arc Lighting* (1897; 1906); *Electricity in Every Day Life* (3 vols, 1904), *Wonder Book of Magnetism* (1908), *The Land of Drought* (1910), *Born an Electrician* (1912).

HOUSTON, SAM (1793-1863). An American

soldier and political leader—a leader, with Stephen F. Austin, in the movement which gained Texas independence from Mexico and a conspicuous figure in the early history of Texas as a State. He was born near Lexington, in Rockbridge Co., Va., March 2, 1793, of Scotch-Irish parentage. After his father's death, in 1806, the family emigrated to Tennessee, where he entered an academy, but left to try a clerkship in a store and, wearying of this, went to live among the Cherokees of east Tennessee. He remained with them three years, when he returned to civilization and taught school. His own opportunities for obtaining an education were scant. In 1813 he enlisted as a private in the United States army, served bravely in General Jackson's campaign against the Creeks, being wounded at Tohopeka, and soon rose to be lieutenant. In 1817 he was appointed agent to aid in negotiations with the Cherokees, incurred the criticism of the War Department, of which John C. Calhoun was Secretary, for attempting to prevent the smuggling of negroes from Florida into the United States, resigned his commission, 1818, and began the study of law at Nashville. He soon opened an office at Lebanon, was made adjutant general of the State in 1819 and major of the State militia. He was elected to Congress in 1822, was re-elected in 1824, and in 1827 was elected Governor by the Jackson Democrats. In January, 1829, he married Miss Allen, a Tennessee lady, but three months afterward left her and, resigning his office without giving either public or private reasons for his course, went to live among his old friends the Cherokees, who had emigrated to Arkansas, and was formally adopted a member of their nation. He championed their cause before Congress, incurring by this much enmity, especially from the "Indian ring," and becoming involved in an encounter with William R. Stanberry, Representative from Ohio, who had accused him of fraudulent attempts to obtain a contract for Indian rations. For beating Stanberry he was reprimanded in the House of Representatives and was tried and fined, but President Jackson remitted the fine. Between Jackson and Houston there existed an unbroken friendship. The incident served to give Houston once more a national notoriety.

Visiting Texas in December, 1832, he was invited to settle there and become the leader of the American colonists in their struggle for their rights. He complied and was elected a delegate to the convention held April 1, 1833, to form a State constitution and seek membership in the Mexican Republic, separate from the State of Coahuila, with which Texas had hitherto been joined and in which the anti-American party was predominant. The rejection of the constitution and the attempt to disarm the Americans led to open warfare, and Houston was then chosen general of the military district east of Trinity River and soon afterward commander in chief of the Texan army. At the head of a small force of undrilled volunteers he led in the military movements which resulted in the defeat of Santa Anna on the San Jacinto, April 21–22, 1836, and in the independence of Texas. His force numbered less than 800, the great majority of whom were old settlers, while the Mexicans had about 1600. In September he was elected President of Texas, succeeding David G. Burnett, the first president

of the Republic, and from 1841 to 1844 he served again, succeeding M. B. Lamar. Texas having been admitted as a State of the American Union in 1845, Houston was chosen one of its representatives in the Senate from 1846 to 1859. In 1859 he was again elected Governor of Texas but opposed secession in 1861 and refused to take an oath of allegiance to the Confederate States, for which, on March 18, 1861, he was declared deposed. Both as Governor and as Senator he upheld the rights of the Indians. He retired to Huntsville, Tex., where, on July 23, 1863, he died. Consult W. C. Crane, *Life and Select Literary Remains of Sam Houston* (Philadelphia, 1884); Henry Bruce, *Life of General Houston* (New York, 1891), in the "Makers of America Series"; A. M. Williams, *Sam Houston and the War of Independence in Texas* (Boston, 1893); R. M. McElroy, *The Winning of the Far West* (New York, 1914). See TEXAS.

HOUSTON, hous'ton WILLIAM (1844–) A Canadian educator and journalist, born at Lanark, Ontario, and educated at Toronto University. He was early a reporter and an editorial writer for the Toronto *Globe* and later an editorial writer on the St. John (New Brunswick) *Daily Telegraph* and the Toronto *Liberal*. In 1883–92 he was librarian of the Ontario Legislature, in 1887 member of a commission to investigate foreign municipal systems, in 1892–99 director of teachers' institutes for Ontario, and later up to 1904, public-school inspector for Algoma and Manitoulin districts. In 1906 he was lecturer on Canadian constitutional history in Toronto University. He afterward became an editorial writer on the *Globe*. He contributed largely to educational and other journals, lectured on historical subjects before university extension classes, and edited *Documents Illustrative of the Canadian Constitution* (1891).

HOUTMAN, hout'man, CORNELIS (?–1599) A famous Dutch traveler and founder of trade with the East Indies, born at Gouda in the middle of the sixteenth century. He went on a trading voyage with his brother, Frederik, to Lisbon in 1593, where he was thrown into prison. Released by a friend, he studied the Portuguese routes to the Far East and, returning with charts to Amsterdam, organized an expedition which sailed in four ships out of the Texel (1595). He rounded the Cape of Good Hope, passed through the Strait of Sunda to the south coast of Java, and returned safely to Holland in 1597, having demonstrated an easy route to the Spice Islands. This voyage was followed by many others and led to the formation of the Dutch East India Company. In a second expedition of two ships in a conflict with the natives of Achin, assisted by the Portuguese, he was killed—His brother, FREDERIK (1570–1627), navigator of his fleet, also played an important part in the opening of the East to trade and commerce. In 1598 he was taken prisoner by the King of Achin, but, having been freed by Paulus van Caerden, he reached Holland in 1601; in December, 1603, he went again to the East Indies and in 1605 was made Governor of Amboyna, in 1618 of the Moluccas and in 1625 was honored with a gold medal for having opened the treasures of the East to Dutch enterprise. Almost as great as his exploits in war and commerce and explorations were his linguistic attainments. Having learned

the Malay language during his captivity in Achin, he opened the Malay languages to European study. In 1603 he published a dictionary with grammatical notes of Malay and Madagascar, with comparison of many Arabic and Turkish words, which work was republished in 1680 as a grammar and dictionary of Dutch and Malay. In 1880 bronze statues of the brothers Houtman were erected at Gouda, from models by Stiackee of Amsterdam. See EAST INDIA COMPANY (*Dutch*), with bibliography.

HOUYHNHNMS, hōw-in'mz or hōw-in'mz. An imaginary nation of horses, of highly advanced civilization, gifted with reason and without passions, which Gulliver visits, in the fourth part of Swift's *Gulliver's Travels*. Their nature is supposed in the story to be as far superior to that of humanity as it is inferior in actual life.

HOVE. See MADAGASCAR, *Ethnology*.

HOVE, hōv. A municipal borough in Sussex, England, on the English Channel, west of and adjacent to Brighton. The sea wall of Brighton continues into Hove and forms part of the famous promenade. Hove has all the characteristics of its larger neighbor—handsome streets, avenues, squares, public buildings, parks and recreation grounds, maine walk, and baths. It is lighted with electricity. It maintains a free library, with news room, lending and reference departments. It was incorporated in 1898 with a mayor, 10 aldermen, and 30 councilors. Pop., 1901, 36,535, 1911, 42,173.

HOVEDEN, hūv'den or hōv'den, or **HOWDEN**, ROGER OF (?-c 1201). An English chronicler, born probably at Howden in Yorkshire. He was clerk in the household of Henry II and was employed by him on various missions. He was appointed an itinerant justice for the forests of Cumberland, Northumberland, and Yorkshire in 1189 and is supposed to have retired to Howden to write his *Cronica*. This begins with the year 732. Most of the work is copied, but from 1192 to 1201 is in his own writing and has a certain value. The *Cronica* was edited by Bishop Stubbs (4 vols., 1863-71). An English translation by Riley was published in London in 1853 in the *Bohn Library* and is still in print.

HOVELACQUE, ōv'-lak', ALEXANDRE ABEL (1843-96). A French linguist and anthropologist, born in Paris. He was a pupil of Chavée in languages and of Broca in comparative anatomy. In 1876 he was one of the founders of the *Ecole d'Anthropologie*, in which he was made professor of linguistic ethnography, and of which, after the death of Gavarret, he became director (1890). In spite of his scientific interests he took an active part in politics as an extreme Republican. From 1888 to 1890 he was mayor of Paris. His works include *Mélanges des linguistique et d'anthropologie* (1889), with Emile Picot and Julien Vinson, *Les races humaines* (1882), *Précis d'anthropologie* (1887), with G. Hervé. In 1886 Hovelacque and Chavée founded the *Revue de Linguistique*.

HOVEN. See BLOAT.

HOVENDEN, THOMAS (1840-95). An American genre painter, born in Dunmanway, Ireland. He studied first in Cork, in New York at the National Academy of Design, having come to America in 1863; and in Paris for six years with Cabanel. He became a member of the National Academy in 1882. His French paintings picture life in Brittany, among them

are "A Brittany Woman Spinning," "News from the Conscript," "Loyalist Peasant Soldier of La Vendée," "A Breton Interior, 1793." Two of his American subjects are in the Metropolitan Museum, New York—"Jerusalem the Golden" and the "Last Moments of John Brown," his only historical picture. His studies of negro life, begun soon after his return from France, are excellent. Typical of his latest and best work is "Breaking Home Ties," a country boy leaving home to make his fortune. The story is told clearly and beautifully, and the sentimentings true.

HOVEY, hūv'i, ALVAN (1820-1903). An American Baptist theologian. He was born at Greene, N. Y., and graduated at Dartmouth in 1844 and at Newton Theological Institution in 1848. After a year spent in the ministry he returned to Newton Centre as a teacher, became professor of Church history (1853), of theology and Christian ethics (1855), and was president from 1868 until 1899, and afterward was professor of apologetics. Among his works are *The State of the Impenitent Dead* (1858), *The Scriptural Law of Divorce* (1866), *Manual of Christian Theology* (6th ed., 1900), *Systematic Theology and Christian Ethics* (1877), *Biblical Eschatology* (1888), *Studies in Ethics and Religion* (1892), *Christian Teaching and Life* (1895).

HOVEY, ALVIN PETERSON (1821-91). An American soldier and public official. He was born at Mount Vernon, Ind., attended the common schools, studied law, was admitted to the bar in 1843, and served successively as a circuit judge, judge of the Supreme Court, and United States district attorney. At the outbreak of the Civil War he was appointed major of Indiana Volunteers and later became major general. The battle of Champion's Hill in 1863, which Grant considered the turning point of his Vicksburg campaign, was won largely through General Hovey's efforts. When the war terminated, he returned to his native State and took an active part in politics. He became Minister to Peru in 1866, a member of Congress in 1886, and from 1888 until his death was Governor of Indiana. In 1888 Governor Hovey was elected president of the Service Pension Association of the United States.

HOVEY, CHARLES MASON (1810-87). An American horticultural editor and nurseryman, born at Cambridge, Mass. He edited the *Magazine of Horticulture*, which prospered under his management longer than any other American horticultural journal. He was the first to introduce a pistillate strawberry, the Hovey—the variety that marks the beginning of profitable strawberry culture in the United States. His *Fruits of America*, of which two volumes only were completed, is one of the best examples of art fruit work attempted in this country.

HOVEY, EDMUND ORIS (1862-) . An American geologist, born at New Haven, Conn. In 1884 he graduated from Yale University (Ph.D., 1889), and he also studied at the University of Heidelberg (1890-91). He taught in Minnesota and Connecticut schools, assisted on the United States Geological Survey in 1890 and in 1901-06, had charge of the Missouri mineral exhibit at the Chicago Exposition in 1892-93, and was assistant curator (1894-1900), associate curator (1901-10), and curator after 1910 of the geological department of the American Museum of Natural History. He

published *Martinique and St Vincent* (1902) and papers dealing with vulcanology, seismology, and meteorology

HOVEY, RICHARD (1864-1900) An American poet, born at Normal, Ill. He was graduated at Dartmouth in 1885, studied for one year in the General Theological Seminary, New York, was for a time assistant in the church of St Mary the Virgin, New York, and afterward journalist, actor, dramatist, poet, and lecturer on English literature in Barnard College, New York. He passed some years in Europe and was much influenced by French and Belgian poets, especially Maeterlinck, some of whose work he translated. His original verse was always marked by high aims and grew in grace and power. His untimely death closed a career of exceptional promise. His *Launcelot and Guenevere*—a series of dramas comprising *The Quest of Merlin*, *The Marriage of Guenevere*, and *The Birth of Galahad* (1880-98)—and *Talesin A Masque* (1900), though they scarcely show dramatic mastery, exhibit lyrical power and remarkable imagination. *Seaward* (1893) is an elegy upon T. W. Parsons (qv). Hovey also collaborated with Bliss Carman (qv) in *Songs from Tagabondia* (1893, two later series, 1896, 1900) and published a collection of his miscellaneous poems in *Along the Trail* (1898). In 1908 appeared *To the End of the Trail*, a volume of poems edited by his widow. In these works he showed that he could touch the more immediate and ordinary human interests, but these are, on the whole, not emphasized in his work, which is romantic and idealistic. Consult J. B. Rittenhouse, *Younger American Poets* (Boston, 1904).

HOW, WILLIAM WALSHAM (1823-97) An English prelate, born at Shrewsbury. From Oxford he received the degree of B.A. in 1845 and M.A. in 1847, and after holding several curateships became rector of Whittington, Shropshire (1851), which position he held until he went to the parish of St Andrew Under-shaft in London (1879). In that year he was appointed Suffragan Bishop of Bedford and a year afterward Bishop of Wakefield. He was well known as a devotional writer. His numerous works in prose include *Private Life and Ministration of a Parish Priest* (1873), *Commentary upon St John* (1879), *The Papal Claims in the Light of Scriptural History* (1881), and some *Pastoral Lectures* (1883). He also wrote some *Poems* (1886) and *Hymns* (1886).

HOWADJI, hou-ä-j'i A nom de plume of George William Curtis.

HOWARD A city and the county seat of Elk Co., Kans., on the Elk River, 76 miles south of Emporia, on the Atchison, Topeka, and Santa Fe Railroad (Map: Kansas, F 7). Farming and stock raising are the leading industries. The gas and electric-light plants are owned by the city. Pop., 1900, 1207, 1910, 1163.

HOWARD. A noble English family, which for many centuries has stood at the head of the English peerage and has held the Dukedom of Norfolk since the middle of the fifteenth century. The earliest of the house to gain distinction was Sir William Howard, a learned Chief Justice of the Common Pleas under Edward I and Edward II. His grandson, Sir John Howard, was admiral and captain of the King's navy in the north of England and also sheriff of Norfolk, in which county he held extensive

estates, subsequently increased by the marriage of his grandson, Sir Robert, with the coheirress of the house of Mowbray, Dukes of Norfolk. The only son of this union was Sir John Howard, one of the leading supporters of the house of York, who, having gained early distinction in the French wars of Henry VI, was appointed by Edward IV constable of the important castle of Norwich and sheriff of Norfolk and Suffolk. Afterward he became treasurer of the royal household, obtained a grant of the whole benefit that should accrue to the King by coinage of money in the city and Tower of London and elsewhere in England, and was raised to the peerage as Lord Howard and Duke of Norfolk. We find him in 1470 made captain general of the King's forces at sea and most strenuous in that capacity in his resistance to the house of Lancaster. Finally he was created Earl Marshal of England, an honorary distinction still borne by his descendants, and in 1484 was appointed Lord Admiral of England, Ireland, and Aquitaine. He fell next year, however, on Bosworth Field, and after his death his honors were attainted, as also were those of his son Thomas, who had been created Earl of Surrey. The latter, however, after suffering three years of imprisonment in the Tower of London, obtained a reversal of his own and his father's attainders and became distinguished as a general, winning fame by his defeat of the Scots at Flodden in 1513. His son Thomas, third Duke of Norfolk, by his marriage with a daughter of King Edward IV, became the father of the accomplished but ill-fated Earl of Surrey, who was put to death by Henry VIII. Norfolk, too, was sentenced, but the death of Henry saved him from the block. The Earl's son Thomas, fourth Duke of Norfolk, suffered attainder and was executed on Tower Hill for high treason, for his communication with Mary, Queen of Scots. The family honors, however, were restored, partly by James I to his grandson, and partly by Charles II to his great-great-grandson, Thomas, who became eighth Duke, and whose cousin and successor, Charles, ninth Duke, was the direct ancestor of the present Duke of Norfolk.

In one or other of their widespread branches the Howards either have enjoyed within the last three centuries, or still enjoy, the earldoms of Carlisle, Suffolk, Berkshire, Northampton, Arundel, Wicklow, Norwich, and Effingham, and the baronies of Bindon, Howard de Walden, Howard of Castle Rising, and Howard of Effingham.

Among the other distinguished members of the family, Sir Edward Howard, brother of the first Earl of Surrey, was made by Henry VIII King's standard bearer and admiral of the fleet, in which capacity he lost his life in boarding a French vessel off Brest in 1513, his brother, Sir Edmund, acted as Marshal of the Horse at Flodden, and his half brother, Sir Thomas Howard, was attainted and died a prisoner in the Tower, for aspiring to the hand of Lady Margaret Douglas, daughter of Margaret, Queen of Scotland, and niece of Henry VIII, one of whose ill-fated consorts was Lady Catharine Howard. Consult Dugdale, *Baronage of England* (London, 1675-76); Collins, *Peerage of England* (5th ed., 1b, 1779); Howard, *Memorials of the Howard Family* (privately printed, 1834); Lodge, *Portraits of Illustrious Personages* (London, 1835); *The*

Howard Papers, with a Biographical Pedigree and Criticism by Canston (ib, 1862), Yeatman, *The Early Genealogical History of the House of Arundel* (ib, 1882), Doyle, *Official Baronage of England* (ib, 1886). Brennan and Statham, *The House of Howard* (ib, 1907)

HOWARD, BENJAMIN CHEW (1791-1872). An American statesman, born at Belvedere, Md., son of John Eager Howard, Revolutionary officer, and grandson of Chief Justice Benjamin Chew. He was educated at Princeton (1809), studied law, and practiced in Baltimore. In 1814 he was active in the defense of the city, and he fought at North Point. He was a United States Representative (1829-33, 1835-39), became head of the Committee on Foreign Relations, and wrote its report on the boundary question. For 20 years he was reporter of the United States Supreme Court. He was nominated for Governor of his State in 1861, but withdrew his name. In the same year he was delegate to the Peace Congress. His *Reports of Cases in the Supreme Court of the United States from 1843 till 1855* was published in the latter year.

HOWARD, BLANCHE WILLIS (1847-98). An American novelist, born in Bangor, Me. She was educated in New York City, but dwelt after 1878 in Stuttgart, where she taught and wrote. In 1890 she married Baron von Teuffel, a physician. The more noteworthy of her novels are: *One Summer* (1875), *Just Serena* (1880), *Guenn* (1882), *Julnay Tower* (1886); *The Open Door* (1889), *No Heroes* (1893), a story for boys, *A Fellow and his Wife* (1892), in collaboration with William Sharp, *Seven on the Highway* (1897), a volume of short stories, the posthumously published *Dionysius the Weaver's Heart's Dearest* (1899); *Garden of Eden* (1900). She wrote also a book of travel, *One Year Abroad* (1877).

HOWARD, BRONSON (1842-1908). A well-known American dramatist, born at Detroit. He prepared for college at New Haven, but instead of entering Yale turned to journalism in New York. From 1867 to 1872 he worked on several newspapers, among them the *Evening Mail* and the *Tribune*. So early as 1864 he had written a dramatic piece called *Fantine*, which was played in Detroit, but his first important play was *Saratoga*, produced by Augustin Daly in 1870. It was very successful and became the first of the long series of pieces which gave Mr. Howard a foremost position among American playwrights. Among his other best-known plays are: *The Banker's Daughter* (1878), *Old Love Letters* (1878), *Young Mrs. Winthrop* (1882), *One of our Girls* (1885), *The Henrietta* (1887, revived in 1913 as *The New Henrietta*), *Shenandoah* (1889), *Aristocracy* (1892). In 1899 he collaborated with Brander Matthews in *Peter Stuyvesant Aristocracy*, which is a satire upon some features of Anglomaniac in American society, has been called its author's best play, though the war drama *Shenandoah* is more ambitious, and *Old Love Letters*, in quite a different line, is an inimitable bit of sentimental comedy. Howard married a sister of Sir Charles Wyndham, the English actor, and he had homes both in New York and in London, where some of his plays have been no less popular than in America. He was a member of the American Academy of Arts and Letters. Consult M. J. Moses, *The American Dramatist* (Boston, 1911).

HOWARD, CATHARINE (1520-42). Fifth

wife of Henry VIII. She was a daughter of Edmund Howard, third son of the Duke of Norfolk. The King married her soon after the divorce of Anne of Cleves, in 1540. She was accused of immoral conduct before her marriage and of suspicious conduct after it. Her guilt before marriage was established, and, with Lady Rochford, who had connived at her wrongdoing, she was beheaded, Feb. 13, 1542. Consult Brennan and Statham, *The House of Howard* (London, 1907).

HOWARD, CLINTON NORMAN (1868-). An American lecturer and temperance advocate. He was born at Pottsville, Pa., and was educated privately. In 1890 he founded and became president of the Prohibition Union of Christian Men, and in 1900 he began his work as a Chautauqua and lyceum lecturer, on such subjects as "God's Measure of a Man," "Why God Made a Woman," and "The Greatest Event in the World." He became vice president of the National Temperance Society.

HOWARD, GEORGE ELLIOTT (1849-). An American educator and author, born at Saratoga, N. Y. He graduated at the University of Nebraska in 1876, studied at the universities of Munich and Paris in 1876-78, and was professor of history in the University of Nebraska from 1879 to 1891. From 1891 to 1901 he was head of the history department and professor of American and institutional history at Leland Stanford Junior University, in 1902 he gave special courses in history at Cornell University, and he lectured on history at the University of Chicago in 1903-04. He returned to the University of Nebraska in 1904 as professor of institutional history and in 1906 was transferred to the chair of political science and sociology. In 1885-91 he was secretary of the Nebraska State Historical Society. He wrote: *Local Constitutional History of the United States* (1889), *The Evolution of the University* (1890), *The King's Peace and the Local Peace Magistracy* (1891), *History of Matrimonial Institutions* (3 vols., 1904), *Preliminaries of the Revolution* (1905), *Social Control and Function of the Family* (1906), *General Sociology* (1907), *The Family and Marriage* (1914). He was a contributor to the NEW INTERNATIONAL ENCYCLOPEDIA.

HOWARD, GEORGE WILLIAM FREDERICK. See CARLISLE, seventh EARL OF.

HOWARD, HENRY. See SURREY, EARL OF.

HOWARD, JACOB MERRITT (1805-71). An American legislator, born at Shaftsbury, Vt. He graduated at Williams College in 1830, studied law, and began to practice in Detroit, Mich. He was a member of the State Legislature in 1838 and in 1840 was elected to Congress as a Whig, in which party he was an active campaign worker in 1844, 1848, and 1852. He took a prominent part in bringing about a coalition of the Whigs and Free-Soil Democrats in 1854, was the author of the platform drawn up at a State convention of the two parties held at Jackson, Mich., on June 6, 1854, and is said to have suggested the name "Republican" for the new political organization thus brought into existence. He was nominated for Attorney-General of the State by the new party in that year and was elected and reelected twice thereafter, serving until 1859. In 1862 he was elected to the United States Senate, to fill a vacancy caused by the death of Senator Bingham, and was reelected for a full term in 1864. He

translated from the French the *Secret Memoirs of the Empress Josephine* (1847)

HOWARD, JAMES E (1851-) An American engineer physicist and commerce expert He was born at Palmer, Mass., and was educated at Nichols Academy (Dudley, Mass.) and at the Highland Military Academy (Worcester, Mass.) From 1880 to 1910 he served as engineer of tests at the Watertown (Mass.) Arsenal, from 1910 to 1914 was engineer physicist of the Bureau of Standards, Washington, D C., and in 1914 he was appointed by President Wilson to the Interstate Commerce Commission

HOWARD, JOHN (1726-90) An English philanthropist, best known for his work in behalf of prison reform He inherited a considerable fortune from his father and spent his early life in travel Settling at Cardington, Bedfordshire, in 1756, he erected model cottages for his tenants and furnished schools for children of all sects In 1773 he was appointed high sheriff of Bedfordshire, and soon the defective arrangements of prisons and the intolerable distress of prisoners were brought under his notice Finding that all the abuses he had seen at home existed in neighboring counties, he traveled all over the United Kingdom and finally became a self-appointed prison inspector, not only of Great Britain and Ireland, but of all Europe He gave evidence before the House of Commons, and in 1774 laws were passed for the improvement of the sanitation of prisons and the abolition of jailers' fees In 1777 he published his *State of the Prisons in England and Wales, with an Account of Some Foreign Prisons* After each of his many tours new editions, with additional facts, were published One important result of this book was the adoption of the hard-labor system in English prisons In 1785 Howard investigated the infection hospitals of Europe, with a view to discovering the best means of preventing the plague, and published *An Account of the Principal Lazarettos in Europe* (1789) He died of camp fever while studying the Russian military hospitals He was a man of deep religious feelings He traveled more than 50,000 miles in making his investigations, on which he spent at least £30,000 of his own fortune, refusing all government aid Of the numerous works on Howard, consult, especially, his *Correspondence*, edited by J Field (London, 1855), lives by Hepworth Dixon (ib, 1849), by J Field (ib, 1850), by John Stoughton (new ed, ib, 1884), and by G F Russell Barker, in *Dictionary of National Biography*, vol xxviii (ib, 1891)

HOWARD, JOHN EAGER (1752-1827) An American soldier and public official, born in Baltimore Co, Md He served throughout the Revolutionary War, participating in many important battles, becoming lieutenant colonel in 1780, and receiving a silver medal from Congress for his conduct at the battle of Cowpens He was wounded at Eutaw Springs At the close of the war he represented Maryland in Congress from 1787 to 1788 He was the Governor of his State from 1789 to 1792 In 1795 he was a member of the Maryland Senate, was a United States Senator from 1796 to 1803, declining in 1796 the portfolio of Secretary of War, and in 1798 was made a brigadier general by Washington, when a war with France seemed certain He organized a defense of Baltimore

in 1814 when the English forces threatened the city, and two years later was a Federal candidate for Vice President

HOWARD, JOHN GALEN (1864-) An American architect Born at Chelmsford, Mass., he graduated from the Boston Latin School, and after three years of study at Massachusetts Institute of Technology, five years under private architects, and three years at the Ecole des Beaux-Arts, Paris, he established himself as a practicing architect in New York City Notable buildings planned by him include the Montelan (N J) Public Library, the Hearst Memorial Mining Building at the University of California (Berkeley), and the Electric Tower at the Pan-American Exposition, Buffalo, 1901 In the latter year, also, he was appointed supervising architect of the University of California, and of the Alaska-Yukon-Pacific Exposition (Seattle, 1909) he was one of the two architects in chief He became a member of the National Institute of Arts and Letters and in 1910 was elected an Associate National Academician

HOWARD, LELAND OSSIAN (1857-) An American entomologist, born at Rockford, Ill He graduated at Cornell in 1877 and was assistant in entomology at the United States Department of Agriculture until 1894, when he was made chief of the Bureau of Entomology He edited the journal *Insect Life* lectured on entomology at several colleges and universities, and wrote on that subject for the *Century* and *Standard* dictionaries and the *NEW INTERNATIONAL ENCYCLOPEDIA* He was made permanent secretary of the American Association for the Advancement of Science, honorary curator in the United States National Museum, and consulting entomologist of the Public Health Service in 1904 He wrote *Mosquitoes* (1901), *The Insect Book* (1901), *The House Fly—Disease Carrier* (1911), *Mosquitoes of North America* (1912), and bulletins and reports of the United States Department of Agriculture

HOWARD, LUKE (1772-1864) An English meteorologist, born in London From 1796 to 1803 he was a wholesale and retail chemist in partnership with William Allen, but later he conducted the business independently His essay *On the Modification of Clouds* (1802, 3d ed, 1865) established his reputation as one of the founders of the science of meteorology The names—cirrus, cumulus, stratus, and nimbus—which he gave to the different kinds of clouds were generally adopted by other meteorologists His other published works include *The Climate of London* (2 vols, 1818-20; 2d ed, rev, 3 vols, 1833), *Seven Lectures on Meteorology* (1837, 2d ed, 1843), *A Cycle of Eighteen Years in the Seasons of Great Britain* (1842), *Papers on Meteorology* (1854)

HOWARD, OLIVER OTIS (1830-1909) An American soldier He was born in Leeds, Me, graduated at Bowdoin in 1850 and at West Point in 1854, served as chief of ordnance during the Seminole troubles of 1857, and was assistant professor of mathematics at West Point from 1857 to 1861 Leaving the regular army in June, 1861, he became colonel of the Third Maine Volunteers and commanded a brigade in the first battle of Bull Run He was promoted to be brigadier general of United States volunteers in September, participated in the Peninsular campaign, and in the battle of Fair Oaks (June 1, 1862) received a wound

which necessitated the amputation of his right arm. After a short leave of absence he rejoined the Army of the Potomac, took a prominent part in the battle of Antietam, was promoted to be major general of volunteers in November, and was engaged in the battle of Fredericksburg (December 13). In April, 1863, he was placed in command of the Eleventh Army Corps and as such took a conspicuous part in the battles of Chancellorsville and Gettysburg. He then served in the Chattanooga campaign, taking part in the battle of Chattanooga and accompanying Sherman on his march for the relief of Knoxville. From April to July, 1864, he commanded the Fourth Army Corps of the Army of the Cumberland and during the march to the sea and the campaign in the Carolinas commanded the Army of the Tennessee, which constituted the right wing of General Sherman's army. In December, 1864, he was appointed brigadier general in the regular army and in March, 1865, was brevetted major general for services at Ezra Church and during the Atlanta campaign. From May, 1865, to July, 1874, he was commissioner of the Bureau of Refugees, Freedmen, and Abandoned Lands. Within less than three years 1400 schools (not including 700 Sabbath schools) had been established, and many of the freedmen had been enabled to buy and maintain homesteads of their own (See FREEDMEN'S BUREAU). In 1872 Howard was special commissioner to the hostile Apaches of New Mexico and Arizona, and, having been placed in command of the Department of the Columbia (1874), he conducted the operations against the Nez Percés Indians in 1877 and against the Bannocks in 1878. He subsequently was superintendent of the United States Military Academy at West Point (1881-82) and commanded successively the departments of the Platte, of California, and of the East. In 1886 he was appointed major general in the regular army, and in November, 1894, retired from the service. In 1895 he founded the Lincoln Memorial University at Cumberland Gap, Tenn., for the education of the "mountain whites." He was also instrumental in the establishment by the government in 1867 of Howard University, at Washington, D. C., over this institution he presided from 1869 to 1873. Besides numerous magazine articles, his publications include: *Donald's School Days* (1879), *Chief Joseph, or the Nez Percés in Peace and War* (1881), *General Zachary Taylor* (1892), in the "Great Commanders Series"; *Isabella of Castile* (1894), *Fighting for Humanity* (1898), *Henry in the War* (1898), *My Life and Experience among our Hostile Indians* (1907), *Autobiography of O. O. Howard* (2d ed., 2 vols., New York, 1907). Consult H. B. Stowe, *Men of our Times* (ib., 1868).

HOWARD, SIR ROBERT (1626-98). An English dramatist, son of Thomas Howard, first Earl of Berkshire, by Elizabeth, daughter of William Cecil, Lord Burghley. During the Civil War he took the Royalist side; and he was knighted (1644). He was imprisoned under the Commonwealth in Windsor Castle, but after the Restoration lucrative posts were given him, and he sat in Parliament. He is the Crites of Dryden's *Essay on Dramatic Poesy*. Dryden married his sister Elizabeth. Of Howard's five extant plays, *The Committee* (1692), caricaturing the manners of the Commonwealth, is most interesting.

HOWARD, ROY WILSON (1883-) An American newspaper man, born at Gano, Hamilton Co., Ohio. After graduating from the Manual Training High School of Indianapolis, Ind., he became a reporter for the Indianapolis *News* in 1902 thereafter was sporting editor of the Indianapolis *Star*, assistant telegraph editor of the St. Louis *Post-Dispatch*, and news editor of the Cincinnati *Post*, and in 1906 he was New York correspondent of the Scripps-McRae League and then New York manager of the Publishers' Press Association. He became New York manager in 1907, and president and general manager in 1912, of the United Press Association.

HOWARD, THOMAS, EARL OF ARUNDEL. See ARUNDEL.

HOWARD, THOMAS BENTON (1854-). An American naval officer. Born at Galena, Ill., he graduated from the United States Naval Academy in 1873. At the battle of Manila Bay he was navigator of the *Concord* and was subsequently promoted, having command of the *Chesapeake* (1901), the *Nevada* (1903-05), the *Olympia* (1907), the *Tennessee* (1907), and the *Ohio* (1908-09). Becoming rear admiral in 1910, he commanded the fourth division of the Atlantic fleet in 1910-12 and the third division in 1912 and in 1912-13 was president of the Naval Examining and Retiring Board. In 1914 he became commander in chief of the Pacific fleet.

HOWARD, WILLIAM. See STAFFORD, VISCOUNT.

HOWARD, WILLIAM TRAVIS (1867-). An American pathologist. He was born at Statesburg, S. C., studied at the University of Virginia (1885-87), graduated from the University of Maryland (M.D., 1889), and took graduate work at Johns Hopkins (1889-93) and at Munich (1906-07). In 1894 he was appointed professor of pathology at Western Reserve University, and he became also pathologist to various Cleveland hospitals and bacteriologist to that city's board of health. In 1902 he was president of the American Association of Pathologists and Bacteriologists. His papers deal with heart hypertrophy, ulcerative endocarditis, origin of gas and gas cysts in the central nervous system, tumors, etiology of smallpox, vaccinia, and other subjects.

HOWARD UNIVERSITY. An institution for higher education, situated in Washington, D. C. It was incorporated by Congress in 1867 and was named for Gen. O. O. Howard, one of its founders and early presidents. It is controlled by a self-perpetuating board of trustees. The university is nonsectarian and is open to students of both sexes without regard to race. It is chiefly known, however, for its work in the higher education of the colored people. It has the following departments, each with the requirements and courses of the standard institutions: College of Arts and Sciences, Teachers College, School of Theology, School of Medicine, including medical, pharmaceutical, and dental colleges, School of Law, School of Manual Arts and Applied Sciences, Conservatory of Music, Library School, Commercial College and Academy. In 1914 it had 115 professors and instructors and 1463 students from 36 States and 10 foreign countries. The theological department is supported from income, from endowment, and from private benefaction, the medical department chiefly from tuition.

The other departments are largely supported by an annual congressional appropriation administered by the Secretary of the Interior. The university has a beautiful campus of over 25 acres in the midst of the city of Washington, D C, and 10 large buildings. Its productive endowment is \$304,000, and its other property is valued at \$1,385,000. The annual budget is \$190,000. The president in 1914 was Stephen M. Newman, A M.

HOWARTH, HOWARTH, ELLEN CLEMENTINE (DORAN) (1827-99). An American poet, born at Cooperstown, N Y. She wrote a number of songs, such as "Tis but a Little Faded Flower," and published a volume, *The Wind-Harp and Other Poems* (1864). Her later work, under the title *Poems* (Newark, N J, 1868), was edited, with an introduction, by Richard Watson Gilder.

HOWE, ALBION PARIS (1818-97). An American artillery officer in the Civil War, born at Standish, Me., and educated at West Point. He entered the Fourth Artillery, from 1843 to 1846 was a mathematical instructor at West Point, served creditably in the Mexican War, was made a captain in 1855, and after the outbreak of the Civil War became General McClellan's chief of artillery in western Virginia in 1861. During the campaign on the Peninsula, in 1862, he commanded a light-artillery brigade in the Army of the Potomac. Having been appointed a brigadier general of volunteers in 1862, he was assigned to a brigade in Couch's division, Fourth Army Corps, was in command of the artillery depot at Washington in 1864-66, and was brevetted major general in the regular army in 1865 for meritorious service during the war. General Howe took part in the battles of Manassas, South Mountain, Antietam, Fredericksburg, and Gettysburg. He was retired from the army in 1882.

HOWE, ELIAS (1819-67). An American inventor, born in Spencer, Mass. His father was a miller, and after working in his mills the boy went, in 1835, to Lowell, where he entered a manufactory of cotton machinery. Two years later he lost his position on account of the financial panic, but finally secured work in a machine shop, first in Cambridge and later in Boston. About 1843 he commenced the practical working out of his idea for a sewing machine, and by 1845 the invention was finished, but, despite its obvious advantages, met with bitter opposition. For the next nine years Howe was wretchedly poor. A trip to England in 1847 in hope of being able to interest capitalists there was unsuccessful, and he sold the English rights to his machine for £250. Upon his return to this country he found that his invention had been pirated, and that many sewing machines were already in use. He obtained influential backing and immediately began action to establish his patent. After long suits he won his case and thereafter was one of the leading manufacturers in the United States. Although improvements on Howe's machines were subsequently made by Singer and others, there is no doubt that the Howe was the original prototype of the present machine. When the Civil War broke out, Howe volunteered as a private in the Seventeenth Connecticut Volunteers. In 1867 he received the gold medal and the cross of the Legion of Honor at the Paris Exhibition.

HOWE, FREDERIC CLEMONS (1867-) An

American authority on municipal problems. Born at Meadville, Pa., he graduated from Allegheny College (1889) and from Johns Hopkins University (Ph D, 1892), and he studied also at Halle, Germany, at the University of Maryland Law School, and at the New York Law School. He practiced law from 1894 to 1909 in Cleveland, Ohio, in 1905, for the United States government, investigated municipal ownership in Great Britain, and in 1906-09 served in the Ohio Senate. He became professor in the Cleveland College of Law and lecturer on taxation at Western Reserve University and in 1906-09 lectured on municipal administration and politics at the University of Wisconsin. He is author of *The City, the Hope of Democracy* (1905), *The British City—The Beginnings of Democracy* (1907), *The Confessions of a Monopolist* (1907), *Privilege and Democracy in America* (1910), *Wisconsin An Experiment in Democracy* (1912), *European Cities at Work* (1913), *The American City* (1914).

HOWE, HENRY (1816-93). An American historian and publisher, born at New Haven, Conn., son of Gen. Hezekiah Howe, the publisher. He entered the publishing business in 1839 and in 1840 began his historical research in New York and New Jersey, together with John W. Barber. He made like studies in Ohio, sketching old landmarks and interviewing old settlers. Soon after the publication of his work in Ohio he removed to Cincinnati, where he published subscription books for nearly 30 years. In 1878 he returned to New Haven, but in 1885 went back to Ohio, prepared a second edition of his history of that State, and entered the publishing business again. He wrote *Eminent Mechanics* (1839), *Historical Collections of New York* (1841), *of New Jersey* (1843), and *of Ohio* (1847 and 1891), *The Great West* (1851), *Travels and Adventures of Celebrated Travelers* (1853), *Life and Death of the Ocean* (1855), *Adventures and Achievements of Americans* (1858), *Our Whole Country* (1861), *Times of the Rebellion in the West* (1867), *Over the World* (1883), and *Outline History of New Haven* (1884) and *New Haven Elms and Greens* (1885), the two last named being pamphlets.

HOWE, HENRY MARION (1848-) An American metallurgist, son of Julia Ward Howe and brother of Laura E. Richards (qqv). Born in Boston, he graduated from Harvard University in 1869 and from Massachusetts Institute of Technology in 1871. In 1897 he accepted the professorship of metallurgy at Columbia University and there remained until he became professor emeritus. In 1895 he received the Elliot Cresson gold medal of the Franklin Institute of Philadelphia, the Bessemer gold medal of the British Iron and Steel Institute, and the gold medal of the Verein zur Beförderung des Gewerbfleisses, and he was honored by the presidency of the American Institute of Mining Engineers (1893) and of the International Association for Testing Materials (1912). He is author of *Copper Smelting* (1885), *Metallurgy of Steel* (1890, 4th ed, 1904), *Metallurgical Laboratory Notes* (1902), *Iron, Steel, and Other Alloys* (1903, 2d ed, rev, 1906).

HOWE, JOHN (1630-1705). A Puritan clergyman, called the *Platonic Puritan*. He was born May 17, 1630, at Loughborough in Leicestershire. He studied both at Cambridge and Oxford, and after preaching for some time

at Winwick in Lancashire and Great Torrington in Devonshire, he was appointed domestic chaplain to Cromwell in 1657. He held the same position under Richard Cromwell, but in 1659 returned to Torrington, where the position he had held during the Commonwealth made him an object of close suspicion to the government. The Act of Uniformity ejected him from his parish (1662), and he wandered about preaching in secret till 1671, when he was invited by Lord Massereene, of Antrim Castle in Ireland, to become his domestic chaplain. There he began his greatest work, *The Good Man the Living Temple of God* (1676-1702), which occupies one of the highest places in Puritan theology. In 1676 he became pastor of the dissenting congregation in Silver Street, London. In 1677 he published, at the request of Robert Boyle, *The Reconcilableness of God's Presence of the Sins of Men with the Wisdom of His Counsels and Exhortations*, in 1681, *Thoughtfulness for the Mourner*, in 1682, *Self-Dedication*, in 1683, *Union among Protestants*, and in 1684, *The Redeemer's Tears Wept over Lost Souls*. In 1685 he was invited by Lord Wharton to travel with him on the Continent; and, after visiting the principal cities, in 1686 he settled, owing to the state of England, at Utrecht. In 1687 King James's "Declaration for Liberty of Conscience" induced him to return to England, and at the revolution the next year he headed the deputation of dissenting clergymen when they brought their address to the throne. Besides smaller works, he published, in 1693, *Carnality of Religious Contention*, in 1694-95, several treatises on the Trinity, in 1699, *The Redeemer's Dominion over the Invisible World*, and he continued writing till 1705, when he published *Patience in Expectation of Future Blessedness*. He died in London, April 2, 1705. His works have been several times reprinted. For his life, consult E. Calamy, memoirs in *Howe's Works* (London, 1724), Henry Rogers (ib., 1879), and R. F. Horton (ib., 1896).

HOWE, JOSEPH (1804-73). A Canadian journalist, orator, and statesman. He was born near Halifax, Nova Scotia, and within a few years after 1817, when he began to learn printing in the office of the *Halifax Gazette*, he was on the editorial staff of that paper. In 1827 he was part owner of the *Weekly Chronicle*, under the name of the *Acadian*, and after 1828 for many years he owned and edited the *Nova Scotian*. Besides his editorial writing, he contributed notable sketches of Nova Scotian life and scenery and the "Legislative Reviews," a series of papers on public men and various needed reforms. In 1835 he was brought into wide public notice by his indictment and trial for alleged libel of the municipality of Halifax, and his speech in his own defense, which gained an acquittal, established his reputation as an orator. Elected a Liberal member of the Nova Scotia Legislature in 1836, he held his seat, except for short intervals, until 1863. Throughout his political career his one main object was the defense of responsible government in his native province, and to its establishment there he had contributed more than any other public man. In 1840 he became a member of the Provincial cabinet, in 1841 was elected Speaker of the Provincial Legislature, and in 1848 was made Provincial Secretary. He was active in promoting railways, in 1854 resigning the Pro-

vincial secretaryship to take charge of the construction of the first Nova Scotia railway. In 1863 he became Provincial Premier. In the issues which precipitated confederation (see CANADA, *History*) he took the keenest interest, but he strongly opposed the plan outlined at the Charlottetown and Quebec conferences, and not until after 1867, when confederation was accomplished, was he willing to give it a qualified support. He was elected a member of the first Dominion Parliament, and, after procuring the passage of resolutions giving better terms to Nova Scotia, he entered the Conservative cabinet of Sir John A. Macdonald in 1869 as President of the Council and in 1870 became Secretary of State. To Nova Scotia Liberals this step was political apostasy. Howe was severely blamed, but his course was due to a wise submission to the inevitable, not to any consideration of personal advancement. Long before 1867 he had matured a plan of Imperial consolidation on broader lines than those of the British North America Act, and the failure to realize this embittered him. On May 1, 1873, he was appointed Lieutenant Governor of Nova Scotia, and he died at Halifax a month later. He was the greatest of Canadian political orators in English and was a writer of verse besides. His oratorical masterpiece was the speech delivered at the International Commercial Convention in Detroit in 1865. He published a large number of speeches, letters, and political pamphlets. Consult: William Annand, *Speeches and Public Letters of the Honorable Joseph Howe* (2 vols., Boston, 1858; new ed., 1909), G. M. Grant, *Joseph Howe* (Halifax, 1904), J. W. Longley, *Letters and Speeches of Joseph Howe* (Toronto, 1904). See also CANADIAN LITERATURE.

HOWE, JULIA WARD (1819-1910). An American poet, philanthropist, and sociological writer, active in the agitation for the legal and political rights of women. She was born in New York, of wealthy parents, and married, in 1843, Dr. S. G. Howe, a philanthropist, best known for his labors for the education of the blind. With him she edited the *Boston Commonwealth*, an antislavery journal, lecturing also on social subjects and preaching occasionally in Unitarian pulpits. After the war she became a noted advocate of woman suffrage and of prison and other reforms. She was the only woman ever elected a member of the American Academy of Arts and Letters. Her early publications, *Passion Flowers* (1854), *Words for the Hour* (1856), and *Later Lyrics* (1866), were in verse, the best known of her pieces being the stirring "Battle Hymn of the Republic," which was written in 1861. She wrote also two dramas, *The World's Own* (acted in 1855) and *Hyppolytus* (1858). The more significant of her later works are *Sex and Education* (1874), *Modern Society* (1880), *A Life of Margaret Fuller* (1883), a valuable autobiographical *Reminiscences, 1819-99* (1899); and *Sketches of Representative Women of New England* (1905). Florence Howe Hall, Mrs. Howe's daughter, edited a selection from her mother's speeches and essays, *Julia Ward Howe and the Woman Suffrage Movement* (1913). Her verse is collected in *From Sunset Ridge, Poems New and Old* (1898). Consult L. E. Richards, *Two Noble Lives* (Boston, 1911).

HOWE, MARK ANTONY DE WOLFE (1864-) An American editor and author, born

at Bristol, R I In 1886 he graduated from Lehigh University and in 1887 from Harvard University (A.M., 1888). He served as associate editor of the *Youth's Companion* from 1888 to 1893 and again from 1899 to 1913, as assistant editor of the *Atlantic Monthly* in 1893-95, and as editor of the *Harvard Illuminist Bulletin* after 1913 Besides editing *The Memory of Lincoln* (1889), *Home Letters of General Sherman* (1909), *The Beacon Biographies* (31 vols., 1899-1910), and *Lines of Battle and Other Poems by Henry Howard Brunnell* (1912), he published *Shadows* (1897), *American Bookmen* (1898), *Phillips Brooks* (1899), *Boston The Place and People* (1903), *Life and Letters of George Bancroft* (1908), *Harmonies A Book of Verse* (1909), *Boston Common Scenes from Four Centuries* (1910), *Life and Labors of Bishop Hare, Apostle to the Sioux* (1911), *Letters of Charles Eliot Norton* (1913), with Sara Norton, *The Boston Symphony Orchestra* (1914)

HOWE, MARSHALL AVERY (1867-) An American botanist, born at Newfane, Vt. He graduated from the University of Vermont in 1890 and from Columbia University (Ph.D.) in 1898. He was instructor in cryptogamic botany at the University of California in 1891-96, served as curator of the Columbia University herbarium from 1899 to 1901, and thereafter was assistant curator (1901-06) and curator of the New York Botanical Garden. He also served as editor of *Torreya* (1901-07) and as associate editor (1898-1907, 1911-) and editor (1908-10) of the *Bulletin of the Torrey Botanical Club*. Between 1901 and 1910 he participated in scientific expeditions to Newfoundland, the West Indies, and Panama. Besides papers on marine algae, he is author of monographs on *The Hepaticae and Anthocerotae of California* (1899) and of *Phycological Studies* (1905-11).

HOWE, RICHARD, EARL (1726-99) A British admiral, born in London, March 8, 1726, the second son of Emanuel Scrope, second Viscount Howe of the Irish peerage. He left school at Eton when only 14 and went with Anson on the *Severn* to attempt a voyage around the world. He commanded the *Baltimore*, which, with the *Greyhound* and *Terror*, fought two large French frigates off the west coast of Scotland in 1746. The English squadron was beaten, and Howe was severely wounded. In 1755 his ship, the *Dunkirk*, captured the *Alcide* off Newfoundland. His next service was under Sir E. Hawke in the expedition against Rochefort. Ordered to attack the fort on the Isle of Aix with his ship, the *Magnanime*, he compelled it to surrender and achieved the only material success which attended the expedition. He was commodore of the squadron which sailed in 1758 for Saint-Malo. The troops were landed and reembarked without loss, after destroying all the magazines and shipping in the port. In the same year he took Cherbourg and destroyed the magazines and cannon. A second attack upon Saint-Malo was repulsed with great loss of life. In 1758, after his brother, a brigadier general, was killed at Ticonderoga, Howe succeeded to the Irish title of Viscount and to the family estate. He continued his distinguished naval service to the end of the Seven Years' War.

In 1760 he was made colonel of the Chatham division of marines and afterward First Lord

of the Admiralty and Treasurer of the Navy. He was made a rear admiral in 1770 and a vice admiral in 1775. In 1776 he was placed in command of the fleet on the American coast. In 1778 he held his own against a superior naval force under D. Estaing. He was made a viscount of Great Britain in 1782. In that year he set out with a fleet to relieve Gibraltar. He succeeded in disembarking troops, ammunition, and supplies, and then offered battle to the combined fleets of France and Spain which declined an engagement. This achievement gave Howe a brilliant reputation. He was made First Lord of the Admiralty in 1783 and received an English earldom in 1788. When the war with France broke out in 1793, he took the command of the Channel fleet and next year gained the victory known as that of "the glorious first of June." The French fleet consisted of 26 ships of the line, and the English of 25. Howe, in his flagship, the *Queen Charlotte*, engaged, off Ushant, the French admiral, who in less than an hour crowded all the sail he could carry, followed by as many of his ships as could get away. The English captured two ships of 80 guns and four 74s; another 74 sank immediately after she was taken possession of. London was illuminated three nights in honor of the victory, the thanks of Parliament were voted to Howe, and George III gave him a sword and made him Knight of the Garter. His last service was in bringing back the mutinous seamen at Portsmouth to their duty in 1797. He died Aug. 5, 1799. Consult *British Magazine and Review*, June, 1783 (London, 1783), Sir John Barrow, *Life of Richard, Earl Howe* (ib., 1838); *Memoir of the Life of Admiral Sir Edward Codrington*, edited by Lady Bouchier (ib., 1873), J. K. Laughton, *From Howard to Nelson* (ib., 1899), E. Chevalier, *Histoire de la marine française* (Paris, 1900).

HOWE, ROBERT (1732-85) An American patriot and soldier, born in Brunswick Co., N. C. After serving against the Indians he was elected to the Assembly in 1765, and the same year Governor Tryon nominated him commander of Fort Johnson on the Cape Fear River. He served in the Assembly until 1775, was a member of the Provincial congresses of 1774 and 1775, and took a prominent part in the preparations for revolt. On Sept. 1, 1775, he was made colonel of the Second North Carolina Regiment, afterward a part of the Continental troops, and aided General Woodford in driving Lord Dunmore, the British Governor, from Virginia. He was made brigadier general of the Continental troops March 1, 1776, and was especially excepted from the general offer of amnesty issued by Sir Henry Clinton. He was made major general Oct. 20, 1777, and placed in command of the Department of the South. An unsuccessful expedition to Florida resulted in the abandonment of Savannah in December, 1778, and Howe was succeeded in his command by Gen. Benjamin Lincoln. He commanded the North Carolina troops at the defense of Charleston (1780) and was in command of West Point the same year. In 1781 he was tried by court-martial for the loss of Savannah on the complaint of the Georgia Assembly, but was honorably acquitted. During this year and again in 1783 he was sent by Washington to reduce mutinous regiments and was entirely successful. He was sent to pacify the Indians of the West in 1785, and the same year was elected to the

North Carolina Legislature, but died before taking his seat.

HOWE, SAMUEL GRIDLEY (1801-76) An American reformer and philanthropist, born in Boston. He graduated at Brown in 1821 and took the degree of M.D. at Harvard Medical School in 1824. Stirred by the poems of Byron, he offered his services to the Greeks in their struggle for independence. In Greece his services were not confined to the duties of a surgeon, in which capacity he had volunteered, but were of a more military nature, and his bravery, enthusiasm, and ability as a commander, as well as his humanity and nobility of character, won for him the title of "the Lafayette of the Greek Revolution." He continued in the service until 1827, when he returned to America to raise funds and supplies to alleviate the famine and suffering in Greece. Through his efforts more than \$60,000 was raised, besides large donations of food and clothing, with which, after writing his *Historical Sketch of the Greek Revolution* (1828), he went again to Greece, where he remained until 1830 and became surgeon in chief of the Greek fleet. Before leaving Greece he settled a successful colony of exiles at Corinth. He then spent some time in medical studies at Paris, where his enthusiasm for a republican form of government led him to take part in the July revolution. In the following year he returned to the United States and became interested in the work with which his name will be longest connected—the education of the blind. He returned to Europe to study the existing systems in England and France, but his investigations were interrupted in the winter of 1831-32, when he became chairman of the American-Polish Committee at Paris, organized by himself, J. Fenimore Cooper, S. F. B. Morse, and several other Americans living in the city, for the purpose of giving relief to the Polish political refugees who had crossed over the Prussian border into Prussia. Dr. Howe undertook to distribute the supplies and funds personally and while in Berlin was secretly seized by the Prussian authorities and imprisoned for five weeks. In the latter part of the same year (1832) he returned to Boston, where he met with great success in his educational work, and the Perkins Institution for the Blind, as it was named in honor of its principal benefactor, became the greatest school of its kind in the world. Dr. Howe himself was the originator of many improvements in method as well as in the processes of printing books in raised types. Besides acting as superintendent of the Perkins Institution to the end of his life, he was instrumental in establishing a large number of institutions of a similar character throughout the country. At the Perkins Institution his most remarkable achievement was in the education of Laura Bridgman. The care and education of idiots and feeble-minded, the reform of prisons, abolition of imprisonment for debt, and finally the abolition of negro slavery in the United States, all engaged Howe's attention. He entered publicly into the antislavery struggle for the first time in 1846, when, as a "Conscience Whig," he was an unsuccessful candidate for Congress against Robert C. Winthrop. In 1851 he was one of the founders and editor of an antislavery paper, the *Boston Daily Commonwealth*, upon which his wife, Julia Ward Howe (qv), whom he had married in 1843, assisted him. He was one of the most prominent mem-

bers of the Kansas Committee in Massachusetts, and with Sanborn, Stearns, Theodore Parker, and Gerrit Smith, was interested in the plans of John Brown, although he disapproved of the latter's attack upon Harper's Ferry. During the Civil War Howe was one of the directors of the Sanitary Commission and at its close entered into the work of the Freedmen's Bureau. He was the originator of the State Board of Charities of Massachusetts, in 1863, the first board of the sort in America, and was its chairman from that time until 1874. In 1866 he made a last trip to Greece to carry relief to the Cretan refugees and in 1870 was a member of the commission sent by President Grant to inquire into the practicability of the annexation of Santo Domingo. It is probably not too much to say that no man ever lived in America who so truly deserved the name "philanthropist" in its highest and best sense—a lover of his fellowmen, and no American certainly was ever connected with more great reforms that were brought to a successful conclusion. Consult F. B. Sanborn, *Dr. S. G. Howe, the Philanthropist* (New York, 1891), L. E. Richards (ed.), *Letters and Journals* (2 vols., Boston, 1906-09), id., *Two Noble Lives* (ib., 1911).

HOWE, TIMOTHY OTIS (1816-83) An American lawyer and politician, born in Livermore, Me. After graduating from Redfield Seminary he was admitted to the bar in 1839 and in the following year became a Whig member in the Maine Legislature. In 1840 he was obliged by ill health to give up his career in Maine and removed to Green Bay, Wis., which was his home during the rest of his life. In 1850 he was elected judge of the Circuit and Supreme courts of Wisconsin. From 1861 to 1879 he was a member of the United States Senate as a Republican and served on the committees of Finance, Commerce, Pensions, and Claims. He declined an appointment to the vacancy in the United States Supreme Court occasioned by the death of Judge Chase. In 1881 he became Postmaster-General in President Arthur's cabinet and in the latter part of that year went to Paris as a United States delegate to the International Monetary Conference.

HOWE, WILLIAM, fifth Viscount (1729-1814) A British soldier in the American Revolution, younger brother of Richard, Earl Howe. Until 1799 he was known as Sir William Howe. He was born Aug. 10, 1729, was educated at Eton, was appointed a cornet in 1746, and saw service in Flanders. In 1750 he became captain, and in 1757, having attained the rank of lieutenant colonel, he was placed in command of the Fifty-eighth Foot and sent with it in the following year to America, where he took part in the siege and capture of Louisburg and accompanied Wolfe on his expedition to Quebec. After the capture of Montreal, in 1760, he returned to Europe, and in 1762 was adjutant general of the expedition against Havana. After the close of the Seven Years' War he was made colonel of the Forty-sixth Foot (1764), was elected to Parliament as a Whig from Nottingham, and in 1768 was appointed Lieutenant Governor of the Isle of Wight. He attained the rank of major general in 1772. Although opposed to the government's course, he commanded the reinforcements sent to General Gage at Boston in March, 1775. He commanded the British in the battle of Bunker Hill, on June 17

following Later he was made a lieutenant general and in October succeeded Gage in command of all the troops in America outside of Canada, with the local rank of general He was besieged in Boston by Washington during the winter of 1775-76 and, being compelled to abandon the city, withdrew his troops to Halifax and afterward transferred his command to Staten Island, whence he moved on New York, winning the battle of Long Island on Aug 27, 1776, and occupying the city on September 15 On October 28 he defeated Washington at White Plains and afterward captured Forts Washington and Lee, after which he settled down in New York for the winter It was not until June, 1777, that he again took the field Wishing to reach Philadelphia, and finding that he had not a sufficiently large force to advance across New Jersey in the face of Washington's army, he embarked his troops and sailed down the coast and up the Chesapeake Bay as far as Elkton, where he landed his forces on August 28 Marching northward, he encountered and defeated Washington at the Brandywine on September 11 and on September 27 occupied Philadelphia On October 4 the Americans were repulsed at Germantown After hearing the news of Burgoyne's surrender at Saratoga on October 17, Howe made arrangements to stay in Philadelphia during the winter, while Washington went into winter quarters at Valley Forge Howe had sent in his resignation shortly after taking Philadelphia, but it was not accepted until May, 1778, when Sir Henry Clinton was appointed to succeed him He was severely criticized for his inactivity at Philadelphia, and in 1779, after his return to England, his conduct was the subject of a parliamentary inquiry, but the examining committee reached no definite decision in the matter In 1782 he became lieutenant general of ordnance and attained the rank of full general in the following year He died at Plymouth, July 12, 1814 Consult S G Fisher, *The Struggle for American Independence* (Philadelphia, 1908)

HOWE, WILLIAM HENRY (1846-). An American animal painter He was born at Ravenna, Ohio, was educated in the public schools, and, having studied art in Paris under Otto de Thoen and Vuillefroy, became known especially for his paintings of cattle He won a gold medal at the Paris Salon in 1888, and gold medals or other honors with pictures exhibited at various expositions (New Orleans, 1885, Paris, 1889, Chicago, 1893) His work was also represented in the art exhibitions of London, Boston, New York, and San Francisco He became an officer of the French Academy in 1896, received the cross of the Legion of Honor in 1898, was elected an Associate National Academician in 1894 and a National Academician in 1897, and was a member of the jury of awards at the St Louis Exposition in 1904

HOWE, WILLIAM WIRT (1833-1909) An American jurist, born at Canandaigua, N Y After graduating from Hamilton College he practiced law in New York and St Louis, Mo He served in the Union army during the Civil War, rising to the rank of major, settled in New Orleans, La., and from 1868 to 1873 was associate justice of the Louisiana Supreme Court In 1897 Judge Howe was elected president of the American Bar Association. He was widely known as a lecturer and wrote several

papers on the history of New Orleans and on civil law

HOWELKE, JOHANNES See HEVILIUS

HOWELL A city and the county seat of Livingston Co., Mich., 33 miles east by south of Lansing, on the Pere Marquette and the Ann Arbor railroads (Map. Michigan F 6) It has the State sanatorium for the treatment of tuberculosis and a Carnegie library It is in the centre of a Holland Holstein-Friesian cattle-breeding region and has manufactures of flour, condensed milk, wheel plows centrifugal pumps, etc The water works and electric-light plant are owned by the city Pop., 1900, 2518 1910, 2338

HOWELL, CLARK (1863-) An American editor He was born in Bainwell Co. S C, and graduated at the University of Georgia in 1883 After an apprenticeship in newspaper work he succeeded Henry Grady as managing editor of the *Atlanta Constitution* in 1889 and became editor upon the retirement of his father in 1897 He was a member of the Georgia House of Representatives in 1886-91 serving as Speaker in 1890-91, and became a member of the Democratic National Committee in 1892 From 1900 to 1906 he was a member and president of the Georgia Senate

HOWELL, HECTOR MANSFIELD (1842-) A Canadian jurist He was born in Hastings Co., Ontario, and was educated at Albert College, Belleville For several years he was a public-school teacher, but afterward studied law and was called to the Ontario bar in 1871 and in 1879 to the bar of Manitoba, where he rose rapidly to be one of the leaders in his profession In 1904 he was elected president of the Manitoba Law Society He entered politics, but was unsuccessful as a Conservative candidate for the Manitoba Legislature Later he joined the Liberal party, owing to the Manitoba school question (See MANITOBA, *History*) In 1906 he was appointed Chief Justice of the Court of Appeal.

HOWELL, JAMES (c 1604-1666). An English author, born in Wales He graduated B A from Jesus College Oxford (1613), traveled extensively on the Continent as a representative of the government He was imprisoned for a time during the Civil War, but after the Restoration he was appointed historiographer royal of England Howell wrote with ease and grace many books, of which the best is *Epistolæ Hædianæ, Familiar Letters, Domestic and Foreign, Divided into Sundry Sections, Partly Historical, Political, and Philosophical* (vol i, 1645, vol ii, 1647, together with a third vol., 1653) These were mostly written in the Fleet Prison and to imaginary correspondents for the most part Consult reprint of the tenth edition by J Jacobs (London, 1890) and, for a popular edition, the "Temple Classics Series"

HOWELL, JOHN ADAMS (1840-) An American naval officer, born at Bath, N Y. He graduated from the United States Naval Academy in 1858, participated in the battle of Mobile Bay in 1864, was stationed at the Naval Academy in 1867-71 and in 1875-79, and was promoted through the various grades to captain in 1884 and rear admiral in 1898 He was commandant of the navy yard at Washington in 1893-96 and of that at League Island in 1896-98, in 1898 commanded the European squadron and the Northern Patrol squadron, and from 1898 to 1902, when he retired, was president of

the Naval Examining and Retiring Board. He wrote the first truly scientific American work on the deviations of the compass, patented a disappearing gun carriage, and originated the gyroscopic steering torpedo. See TORPEDO.

HOWELL, JOHN CUMMING (1819-91). An American naval officer, born in Philadelphia, Pa., and educated at Washington College, Pennsylvania. He was appointed a midshipman in the United States navy in 1836, saw some service in the naval operations of the Mexican War, became commander in 1862, and participated in many engagements during the Civil War. He served as fleet captain of the European station in 1869-70, was commandant of the League Island Navy Yard at Philadelphia in 1871-72 and of the Portsmouth Navy Yard from 1872 to 1874. From 1874 to 1879 he was chief of the Bureau of Yards and Docks, at times acting as Secretary of the Navy, became a rear admiral in 1877, was in command of the European squadron from 1879 to 1881 and was retired on Nov. 24, 1881.

HOWELL, WILLIAM HENRY (1860-). An American physiologist. He was born in Baltimore and graduated in 1881 at Johns Hopkins, where he became associate professor of physiology (1888) and in 1893, after teaching in the University of Michigan and for one year at Harvard, was made professor. He was dean of the Medical School from 1899 to 1911. In 1905 he became a member of the National Academy of Sciences. Dr. Howell contributed to the *London Journal of Physiology*, the *Transactions of the Royal Society*, the *Johns Hopkins Biological Studies*, the *Journal of Morphology*, and the *Journal of Experimental Medicine*. In 1896 he edited *An American Text-Book of Physiology* and wrote a *Text-Book of Physiology* (1905, 5th ed., 1913). He contributed articles on physiology to the NEW INTERNATIONAL ENCYCLOPEDIA. He was associate editor of the *American Journal of Physiology* after 1898.

HOWELLS, WILLIAM DEAN (1837-) An American novelist, editor, poet, and critic, born at Martin's Ferry, Ohio, March 1, 1837, of well-to-do Welsh-Quaker ancestry. Howells spent his youth among books. He began making verses almost as soon as he could read, serving a literary apprenticeship in his father's printing office, afterward as compositor on the *Ohio State Journal* and other newspapers, and still later as correspondent and editor. He first attracted marked attention by poems published in the *Atlantic Monthly*. In 1860 he published *Poems of Two Friends* with John J. Piatt (qv.) and in the same year wrote a campaign *Life of Lincoln*, in recognition of which he received the Venetian consulate (1861-65). As a fruit of his first Italian sojourn we have *Venetian Life* (1866, latest ed., 1907), a work of vivid realism, flexible style, and genuine charm, which was followed by *Italian Journeys* (1867). On his return to America, Howells was connected editorially with the *Tribune*, the *Times*, and the *Nation* of New York and from 1866 to 1881 with the *Atlantic Monthly* of Boston, of which he was the editor from 1872. *Their Wedding Journey* (1871), his first attempt at fiction, was followed, during his Boston residence, by *A Chance Acquaintance* (1872); *A Foregone Conclusion* (1875), *Out of the Question* (1877), *A Counterfeit Presentment* (1877), *The Lady of the Aroostook* (1879), and *The Undiscovered Country* (1880). *A Fearful Responsibility* (1881),

Dr. Breen's Practice (1881), *A Modern Instance* (1882), *A Woman's Reason* (1883), *Three Villages* (1884), and *The Rise of Silas Lapham* (1885) were written during a residence in England and Italy. On his return in 1886 Howells assumed an editorial function for *Harper's Magazine*, developing strong critical powers and steadily opposing the romantic or pseudo-historic in modern fiction, while constituting himself the champion of an uncompromising realism, which he exemplified in his own work. He was also for a short time editor of the *Cosmopolitan Magazine*. The more noteworthy volumes of fiction in this period are *The Minister's Charge* (1886), *Indian Summer* (1886), *April Loves* (1888), *Annie Kilburn* (1889), *A Hazard of New Fortunes* (1890), *The World of Chance* (1893), *The Coast of Bohemia* (1893), *The Story of a Play* (1898), *Ragged Lady* (1899), *Their Silver Wedding Journey* (1899), *Heromes of Fiction* (1908), critical studies of a group of heroines of English novels, *The Flight of Pony Baker* (1902), *The Kentons* (1902). Howells has written also many farces, of which *The Sleeping-Car*, *The Mouse-Trap*, *The Elevator*, and *Out of the Question* are characteristic. Noteworthy also are *Tuscan Cities* (1885), *Modern Italian Poets* (1887), *Criticism and Fiction* (1891), essays, *A Boy's Town* (1890), *A Traveler from Altruria* (1894), in which his quondam leanings towards socialism find expression in the form of fiction, *Impressions and Experiences* (1896), *Literary Friends and Acquaintance* (1900), valuable records, especially as regards New England authors of a generation earlier than Howells, *Son of Royal Langbrith* (1904), *London Films* (1905), one of a number of his charming books of similar nature, in which graphic and subtle description and mellow reflection and comment blend delightfully, *Miss Bellard's Inspiration* (1905), *Certain Delightful English Towns* (1906), *Between the Dark and the Daylight* (1907), *My Mark Twain Reminiscences* (1910), *New Leaf Mills* (1913), *Familiar Spanish Travels* (1913); *Seen and Unseen at Stratford-on-Avon: A Fantasy* (1914). A collected edition of his works, the Library Edition, was published (New York and London) in 1913.

His poems were collected in 1873 and 1886, and a volume under the title *Stops of Various Quills* appeared in 1895. Perhaps, of all the books named above, *The Rise of Silas Lapham* and *A Hazard of New Fortunes* represent their author at his best. He is the founder of the school of American realists who derive through the Russians from Balzac and has little sympathy with any other form of fiction, although full of encouragement for new writers in whom he discovers a fresh note. His style, while simple and natural, is at the same time finished, richly varied, and resourceful, and his knowledge of the details of life is accurate and minute. It can hardly be doubted that his was the most influential work done in American fiction during the last quarter of the nineteenth century.

Like Henry James, Howells has done his country a great service in interpreting America to Europe and hardly a lesser service in interpreting America to itself. Irving turned to legend and history for his material, Cooper to the Indian and border adventure, Hawthorne to a world apart from the light of common day, Poe to the terrible and the grotesque. It remained for Howells, and, with a difference, for

Henry James, to present with unswerving truth and minuteness everyday aspects of the life and character of their country and their countrymen which the earlier novelists who were their compatriots had either idealized out of ready recognition or well-nigh ignored. With a sure sense for the finer elements of the national character, his genius found a way to seize upon and present them in high relief, and with a certain detachment bred of cosmopolitan culture Howells has been with propriety referred to as the dean of American letters. Man of letters essentially he must certainly be counted, not only as a novelist, but as a writer of short plays and witty farces, as poet and literary critic, and as a writer of familiar essays full of ripe wisdom and marked by the subtlety and finish of an accomplished and resourceful literary artist. He was one of the seven chosen by the National Institute of Arts and Letters as first members of the American Academy, and of the latter body he became president.

HOWELL'S STATE TRIALS See **STATE TRIALS**

HOWE TRUSS See **BRIDGE**

HOWISON, GEORGE HOLMES (1834-1916)

An American philosopher, born in Montgomery Co., Md. He graduated at Marietta College in 1852 and at the Lane Theological Seminary in 1855. After holding positions at Washington and Harvard universities, at Massachusetts Institute of Technology, and at the University of Michigan, he was Mills professor of philosophy at the University of California from 1884 until his retirement, in 1909. In philosophy he came to be known as a Kantian, but he developed Kantianism along original lines, arriving at a personal idealism according to which reality is a community of spirits bound together not by causal relations but by sharing a common ideal eternally realized in God, the highest Spirit. He was one of the most successful teachers of philosophy in America, his pupils being found in many colleges and universities in the United States; he also exercised a profound influence on the intellectual life of the Pacific coast, having among other things organized a most successful philosophical club, the Philosophical Union of the University of California, before which have been delivered as addresses what subsequently appeared as important published works, such as Royce's *The Conception of God* and Watson's *Christianity and Idealism*. William James first proclaimed his pragmatism before this Union in an address entitled "Philosophical Conceptions and Practical Results." Howison's publications include *Treatise on Analytic Geometry* (1869) and *Limits of Evolution* (1901, 2d ed, 1905). He edited and contributed to Royce's *The Conception of God* (1897).

HOWITT, WILLIAM (1792-1879) and **MARY** (1799-1888). Two English authors, who may well be treated together. William Howitt was born at Heanor, Derbyshire. His parents were Quakers. Though he attended several schools, he educated himself mostly by reading. From his youth he was fond of outdoor sports, and he celebrated in verse the scenery with which he was familiar. In 1821 he married Mary Botham, daughter of a prosperous Quaker of Uttoxeter, Staffordshire. After living for a year in Staffordshire they settled in Nottingham, where William set up as a druggist. Here they remained for 12 years. They subsequently

lived at Esher in Surrey, London, Heidelberg, and Rome. William spent two years in Australia (1852-54). Somewhat after middle life they became spiritualists. Both died in Rome and were buried there. Soon after their marriage they began to write in collaboration and then independently. Among their joint works are contributions in verse and prose to annuals and periodicals, *The Forest Minstrel* (1823), *The Desolation of Eyam and Other Poems* (1827), *Literature and Romances of Northern Europe* (1852), *Ruined Abbeys and Castles of Great Britain* (1862). Among William's independent works are *Book of Seasons, or Calendar of Nature* (1831), *Popular History of Priestcraft* (1833), *Pantika, or Traditions of the Most Ancient Times* (1835), *Rural Life of England* (1838), *Visits to Remarkable Places* (1st series, 1840, 2d series, 1842), *Boys' Country Book* (1839), *Rural and Domestic Life of Germany* (1842), *Popular History of England* (1856-62), *The Mad War Planet and Other Poems* (1871). Among Mary's independent publications, numbering 110 distinct works, are translations from Fredrika Bremer and Hans Andersen *Sketches of Natural History* (1834), *Popular History of the United States* (1859), a novel called *The Cost of Caerguyn* (1864), *Tales in Prose for Young People* (1864), *Tales in Verse for Young People* (1865), *Tales for All Seasons* (1881). From these lists it may be seen that the Howitts did much for their generation by diffusing knowledge. On the other hand, they wrote little or nothing of permanent value. Consult *Mary Howitt in Autobiography*, edited by her daughter, Margaret Howitt (London, 1889).

HOWITZER (from *howitz*, from Ger *Hau- litze*, formerly *Haubnitz*, from Boh *haufnice*, *haufence*, *howitzer*, sling for casting stones). A type of cannon intermediate between guns and mortars, which may be used as a gun or as a mortar. For example, the 6-inch siege howitzer of the United States army has a variation in elevation from -5° to $+40^{\circ}$. Combining this range of elevation with the three different charges of powder used, the howitzer possesses a flexibility in range and angle of fall not possible with guns and mortars. Field howitzers are designed for a curved fire greater than that of guns and less than mortars. Such fire reaches the *personnel* protected behind shielded guns and steep cover. The ammunition includes both shrapnel for the attack of men and animals, and high-explosive shell for the attack of material objects and overhead cover. A howitzer concealed behind steep cover, over which its curved trajectory makes it possible to fire, can attack the field gun which cannot effectively reply, on account of the flatness of its trajectory.

In recent years European artillerymen have given much attention to the development of light and heavy howitzers designed to accompany an army in the field. The howitzers in service in the United States army are the 3-inch mountain gun or howitzer carried on pack mules, using a 15-pound projectile, the 3.8-inch and 4.7-inch howitzers using 30-pound and 60-pound projectiles respectively. One battalion (3 batteries, equipped with 12 howitzers) of the 3.8-inch pieces is assigned to the artillery brigade forming the divisional artillery. In addition to the above calibres the 6-inch howitzer (120-pound projectile) forms a part of the

heavy field artillery accompanying the mobile army. This piece, using the maximum charge giving a muzzle velocity of 900 feet per second, when fired at an angle of elevation of 40°, gives a horizontal range of 6704 yards, after rising a maximum vertical distance of 4478 feet. The angle of fall is 45°, or a slope of 1 on 1.

In the European War of 1914 the effective employment of large-calibre, powerful howitzers and mortars in the attack of permanent fortifications was one of the notable developments of artillery. For several years before the outbreak of this war Germany, in particular, had successfully experimented with novel types of heavy ordnance. This development was closely watched and copied by other European nations, especially by France, who was in the same position as Germany with respect to defending and attacking fortified places on the land frontiers. Germany, with her usual military foresight, prepared for the inevitable conflict by rushing the construction of a large number of 11-inch howitzers and mortars at the great works of Krupp and Ehrhardt. The characteristics of these are shown in the accompanying table, with the 11-inch French mortar designed

founded and published *Outing* (1882-85), was editor and proprietor of the *Cambridge (Mass.) Tribune* (1885-90), served as publisher and treasurer of the *Outlook* (1900-13), and in 1914 became president of the Independent Weekly Publishing Company (publishers of the *Independent*).

HOWLAND, SIR WILLIAM PEARCE (1811-1907). A Canadian statesman. He was born at Pawling, N. Y., but in 1830 went to Upper Canada, settled in York County, and later became a wholesale merchant in Toronto. Entering politics, in 1857-67 he was a Liberal member of the Canada Legislative Assembly. In 1862-63 he was Minister of Finance in the Macdonald-Sicotte administration, and in 1863-64 Receiver-General in the Macdonald-Dorion administration. In the coalition government of 1864-66 he was Postmaster-General and afterward Minister of Finance. In 1865 he and Sir A. T. Galt (q.v.) were commissioners to Washington in behalf of reciprocity of trade between Canada and the United States. He took a prominent part in the movement for Canadian confederation and in 1866-67 was a delegate at the conference in London, England, at which

COMPARATIVE TABLE SHOWING THE CHARACTERISTICS OF THREE TYPES OF SIEGE HOWITZERS AND MORTARS USED BY THE GERMANS AND FRENCH IN THE EUROPEAN WAR, 1914

	French Schneider mortar	German Krupp howitzer	German Ehrhardt mortar
Calibre, inches	11.023	11.023	11.023
Extreme range, yards		11,045	10,327
Common shell, pounds	758*	750*	760 6*
Weight of powder charge, pounds		10 to 30	16.53 to 23.14
Muzzle velocity	853 f s †	1115 f s †	885 f s †
Limit of elevation	10° to 60°	0° to 65°	20° to 60°
Limit of traverse	20°	10°	10°
Weight of mortar, pounds	8,892	13,514	8,818.5
Weight of mortar and carriage complete, pounds	33,082	30,644	22,928
Number of loads after dismounting for transportation	4	2	2
Weight of loads, pounds			
	Gun load	Gun load	Gun load
	10,837	19,687	13,117.5
	Chassis load	Carriage load	Carriage load
	10,660	17,990	14,109.5
	Carriage load		
	8,750		
	Platform load		
	11,220		

* High explosive shells of less weight are also used.

† Variable, according to weight of ammunition used.

by the celebrated ordnance firm of the Schneiders of France. It will be noted that the German *matériel* is transported in two loads, the French in four. The latter therefore has a greater mobility, but takes longer to assemble for firing. The Germans were the first to transport on the gun-carriage wheels and fire therefrom a calibre as large as 11 inches. The results obtained in the reduction of the Antwerp forts in October, 1914, fully justified the existence of these great guns. It is true that the Japanese used 11-inch mortars in the reduction of Port Arthur in 1904-05, but these were coast-defense mortars dismantled in Japan and remounted in front of Port Arthur on specially prepared concrete foundations, whereas the German pieces are transported on and fired from their own carriages. See ARTILLERY, FIELD ARTILLERY, HEAVY FIELD ARTILLERY, SIEGE ARTILLERY, MORTARS, ORDNANCE; HORSE ARTILLERY, MOUNTAIN ARTILLERY.

HOWLAND, WILLIAM BAILEY (1849-). An American publisher, born at Ashland, N. Y., and educated at Williston Seminary. He

were finally settled the terms of union to be embodied in the British North America Act. In 1867 he was elected to the first Dominion Parliament, and until 1868 was Minister of Inland Revenue in the administration of Sir John A. Macdonald. In 1868-73 he was Lieutenant Governor of Ontario. In 1879 he was knighted.

HOWLER, or **STENTOR**. An American monkey of the genus *Myrcetes*, or *Alouatta*, remarkable for the dilatation of the hyoid bone into a hollow drum, which communicates with the larynx, makes a conspicuous external swelling of the throat, and gives prodigious power to the voice, enabling these animals to emit hideous sounds, which are heard miles away, and to which all their names refer. There are two, and sometimes four, other resonators connected with the larynx, besides the one in the hyoid. The howlers live chiefly among the branches of trees and make extraordinary leaps from one to another, taking hold by the tail as readily as by the hands and often swinging by it alone. They are the largest monkeys in the New World.

About seven species are known, occurring from Central America southward to the Rio Grand do Sul. They are sometimes kept in captivity, but are always sullen and untamed. Their habits and brain structure both show that their position is properly among the lowest monkeys. The best-known forms are those of southern Brazil, such as the very black shaggy howler or guereba (*Alouatta caraya*), of which the females and young are dingy white, and the brown araguata, or ursine howler (*Alouatta usina*). The red howler (*Alouatta seniculus*) belongs to the Orinoco region and is distinguished by its bright chestnut color and the ridge of upright red hair across the top of its head. This one is said to furnish the principal animal food used by the natives of the eastern slopes of the Andes, but they are obtained only in the lowlands. Still another species abundant along the lower Amazon, is the yellowish arabata (*Alouatta beelzebub*). See CERBIDÆ, MONKEY, and Plate of AMERICAN MONKEYS with the latter article.

HOWLEY, JAMES PATRICK (1847-) A British-American surveyor and geologist. He was born in St John's, Newfoundland, and was educated at St Bonaventure's College. In 1867 he was appointed assistant geological surveyor and in 1887 became director of the geological survey of Newfoundland. In 1879 he was elected a member of the Mineralogical Society of Great Britain, in 1883 a fellow of the Geological Society (London), and in 1896 a member of the North of England Institute of Mining and Mechanical Engineers. He prepared a large number of reports and articles relating to the resources and geology of Newfoundland and published *The Geology of Newfoundland* (1877).

HO-WO, hō'wō' See FUNG-HUANG

HOWORTH, hō'wəth, SIR HENRY HOYLE (1842-) An English scientific writer and politician, member of the Royal Society. He was born at Lisbon, was educated at Rossall School, and was admitted to the bar, though he practiced law very little, but devoted himself to Lancashire politics and to literature. He served in the House of Commons as a Conservative from 1886 to 1900. He became a member of many geographical and anthropological societies, in 1899 he was made a trustee of the British Museum, and he also served as president of the Archaeological Institute. Howorth's writings, besides letters to the *Times* and contributions to the *Quarterly* and the *Edinburgh*, are on geological, archaeological, ethnological, and historical subjects. Among these are *History of the Mongols* (2 vols, 1876-78), *The Vicars of Rochdale* (1883), *The Mammoth and the Flood* (1887), *Ice or Water* (3 vols, vols 1, ii, 1903), *St Gregory the Great* (1912), *St Augustine of Canterbury* (1913).

HOWRAH, hō'ra. A town of the Presidency of Bengal, India, on the right bank of the Hugh, opposite Calcutta (qv), of which it is the most important suburb (Map India, F 4). Howrah has large jute works, manufactures cottonseed oil, iron, rope, and machinery. It is an important railway terminus and the seat of the Sibpur Civil Engineering College. Pop, 1901, 157,594, 1911, 179,006.

HOWSON, JOHN SATL (1816-85). An English clergyman and author, born at Giggleswick-in-Craven, Yorkshire. He graduated at Trinity, Cambridge, in 1837, was classical master and

later principal of the Liverpool Collegiate Institute (1845-65), and from 1867 until his death was dean of Chester. During the latter period he practically restored the cathedral, raising nearly £100,000 for the purpose. He is best known for his *Life and Epistles of St Paul* (1852), written in conjunction with Rev W J Conybeare. He also published *The Character of St Paul* (1862), *The Metaphors of St Paul* (1868), and other religious works, including commentaries.

HOWTH, hōth or houth. A picturesque peninsula, forming the north shore of Dublin Bay, Ireland (Map Ireland, E 5). It is about 2½ miles long by 2 miles broad and terminates in a cliff 563 feet high, at the foot of which is Howth village, an important fishing station and watering place.

HOXIE, VINNIE REAM (1847-1914). An American sculptor born at Madison, Wis. She studied under Bonnat in Paris and under Majoli in Rome. Shortly after Lincoln's death, and while she was still in her teens, she won a \$30,000 prize in a competition for a statue of the martyred president. The first woman sculptor ever to receive a commission from the government, she executed a life-size figure, which is now in the rotunda of the Capitol at Washington. Congress later commissioned her to make the heroic statue of Farragut in Farragut Square, Washington. Among other works were statues of "The West," "Sappho," and busts of Mayor Powell of Brooklyn and of Ezra Cornell. In 1911 she was chosen to be the sculptor of the statue of Sequoyah to represent Oklahoma in the statuary hall in the Capitol at Washington. She married Gen Richard L. Hoxie in 1878.

HOY. One of the Orkney Islands (qv), Scotland, situated in 58° 50' N, long 3° 20' W, 2 miles southwest of Pomona (Map Scotland, F 2). It is 14 miles long and 6 miles broad and rises abruptly from the sea, with precipitous cliffs 1000 feet in height fronting the west. Area, 53 square miles. Waid Hill, 1564 feet high, commands a fine panoramic view of the islands. Pop, 1891, 1320 1901, 1216, 1911, 1082.

HOY (Flem *hui*, Dutch *heu*, *heude*, of uncertain etymology). A small vessel, usually sloop-rigged, formerly used in large harbors and rivers and to some extent as a coaster. The term is now applied to *pouder hoys*, *anchor hoys*, and similar heavy-built barges (sailing or steam) for carrying ammunition, anchors, or other heavy weights.

HOYEN, hē'yēn, NIELS LAURITS ANDREAS (1798-1870). A Danish art critic, born at Copenhagen, where he entered the university in 1816. In 1822-25 he traveled through Germany, Austria, and Italy to Rome, where he met many artists gathered around Thorvaldsen. After his return he lectured at the academy, where in 1829 he became professor, and at the university after 1856. For years he was, with C J Thomsen, director for *Den kongelige Malerisamling*, and he put into order the art collections in all the royal castles of the kingdom. As lecturer, he exerted a great influence, being an eloquent speaker and enthusiastic in his advocacy of a distinctly national art. The trend of Danish art in the middle of the last century towards the picturing of homely scenes of common life is largely due to Hoyen's influence. His literary works, *Skrifter*, with

Hoyen's Leined, were edited by J L Ussing (3 vols, Copenhagen, 1871-76). Consult J Lange, "Hoyen som Docent og Forfatter," in *Skifter*, vol III.

HOYLAND NETHER A manufacturing town in the West Riding of Yorkshire, England, 5 miles south-southeast of Barnsley. It has large collieries and brickworks. Pop., 1901, 12,464, 1911, 14,638.

HOYLE, EDMOND (1672-1769) An English writer on games. Of his early life nothing is definitely known, although it is asserted that he was educated for the law. For many years he lived in London, writing upon and giving instruction in games, and in 1742 he published *A Short Treatise on the Game of Whist*, which went through many editions and became the world's authority. He also published works on backgammon (1743), piquet (1744), quadrille (1745), brag (1751), and chess (1761). See **WHIST**.

HOYT, ALBERT HARRISON (1826-) An American editor and author, born in Sandwich, N H. He graduated from Wesleyan University in 1850, studied and practiced law in Portsmouth, N H., was a paymaster in the army during the Civil War and rose to be lieutenant colonel, and after the peace was editor of the *New England Historical and Genealogical Register* (1868-76) and of *Memorial Biographies*, vol IV (1885). His other works include *Necrology of the New England Colleges* (1869-70), *Captain Francis Golet's Visit to Boston, etc., in 1745-50* (1870), *Letters of Sir William Pepperell, Bart.* (1874), *The Name Columbia* (1886).

HOYT, CHARLES HALE (1860-1900) An American dramatist, born in Concord, N H. He graduated at the Boston Latin School and, after being engaged in the cattle business in Colorado for a time, took up newspaper work, first with the *St Albans (Vt.) Advertiser*, and later becoming musical and dramatic critic of the *Boston Post*. Finally he turned playwright and wrote a series of farcical comedies, of which *A Trip to Chinatown* (1890) and *A Milk-White Flag* (1893) were the most successful. He was twice a member of the New Hampshire Legislature and was Democratic candidate for Speaker.

HOYT, HENRY MARTYN (1856-1910) An American lawyer and public official, born at Wilkes-Barre, Pa. He graduated from Yale University in 1878 and from the law department of the University of Pennsylvania in 1881. Entering the banking business, he became treasurer and later president of the Investment Company of Philadelphia, but after 1893 he devoted himself to the practice of law in that city. He served as United States Assistant Attorney-General from 1897 to 1903 and as United States Solicitor-General from 1903 to 1909. When the office of Counselor of the State Department was created in 1909, he was appointed to that position by President Taft. He participated in the negotiations for a reciprocity treaty between the United States and Canada in 1910.

HOYT, JOHN WESLEY (1831-1912) An American educator and administrator, born near Worthington, Ohio. He graduated at Ohio Wesleyan University (1849), studied law and medicine, and for a time edited and published the *Wisconsin Farmer*. He was State or national commissioner to expositions in London (1862), Paris (1867), and Vienna (1873), and was spe-

cial representative for foreign affairs at the World's Fair, Chicago (1893). In 1873-74, as chairman of the Wisconsin State Board of Railway Commissioners, he helped to settle the Granger war. He reorganized the University of Wisconsin, suggested and framed a bill for the establishment of a national university, was Governor of the Territory of Wyoming (1878-83) and president of Wyoming University (1887-91). His publications include *University Progress* (1869), *Studies in Civil Service* (1878), *Of Appointment and Removal* (1885), *History of University Education* (1903).

HOYT, WAYLAND (1838-1910) An American Baptist clergyman, born at Cleveland, Ohio. After graduating from Brown University in 1860 and from Rochester Theological Seminary in 1863, he held various pastoriates until 1874, when he was called to the Shawmut Avenue Church, Boston. Subsequently he occupied the pulpits of the Tabernacle Church, New York (1876-82), the Memorial Church, Philadelphia (1882-89), the First Church, Minneapolis, Minn (1889-95), and Epiphany Church, Philadelphia, after 1895. He was also a professor in the theological department of Temple University, Philadelphia. He is author of *Hints and Helps in the Christian Life* (1880); *Along the Pilgrimage* (1884), *At His Feet* (1893), *Home Ideals* (1904), *The Teaching of Jesus concerning His Own Person* (1907).

HOZIER, o'zyá', CHARLES RENE d' (1640-1732) A French genealogist, son of Pierre, Seigneur de la Garde, whose work he continued. He succeeded his brother, Louis Roger, as *juge d'armes* in 1666. In 1696 he collected the declarations of those having armorial bearings, who had been ordered to register. This was the beginning of the *Armoiral Général de France*, a collection now in the Bibliothèque Nationale. It comprises 35 volumes containing some 60,000 entries. He published *Recherches de la noblesse de Champagne* (1673), *Remarques sur l'histoire de Charles IX de Valois* (1686), *Recherches des armoiries de Bourgogne*, in manuscript form.

HOZIER, PIERRE d', SEIGNEUR DE LA GARDE (1592-1660) A French genealogist. He belonged to the household of the Marshal de Créquy and gave him aid in his genealogical investigations. In 1616, because of his great heraldic knowledge, he began extensive researches into the genealogy of the princely families of the kingdom. The King, in order to facilitate his work, created him one of the "hundred noblemen" of his household. In 1628 he received the order of Saint-Michel and in 1629 a pension. From this time on his reputation as a genealogist was established. In 1634 he was appointed historiographer and genealogist of France and in 1641 *juge d'armes*. In 1643 he verified the claims of the pages of the household of the King and in 1654 became Councilor of State. He had six sons, two of whom survived him and continued his work. The oldest son, Louis Roger (1634-78), succeeded him as *juge d'armes*. He became blind in 1675 and was succeeded by his younger brother, Charles René (qv). Pierre published a *Recueil armorial des anciennes maisons de Bretagne* (1638), *Les noms, surnoms, qualitez, armes, et blasons des chevaliers et officiers de l'ordre du Saint-Esprit* (1634). At his death his genealogical notes, *Généalogie des principales familles de France*, which comprise some 150 volumes, in manuscript form, were deposited in the Bibliothèque Nationale. He is said to have

helped Renaudot (qv) establish his *Gazette de France* (1631)

HŌZUMI, hō'zō'mē', NOBUSHIGE (1855-) A Japanese jurist and educator. He studied in Tokyo, became an English barrister of the Middle Temple, and attended Berlin University. As professor in the University of Tokyo, he did much for the reorganization of that institution. He was a member of the House of Peers in 1890-92, was one of the commission of three that drafted the Japanese civil code, and was chairman of the committee to revise the criminal code. Besides works in Japanese on codification and other subjects, he wrote, in English, *Incestor Worship and Japanese Law* (1901) and *The New Japanese Civil Codes as Material for the Study of Comparative Jurisprudence* (1904).

HRABANUS MAURUS, ra-ba'nō's mou'roos. See **RABANUS MAURUS**.

HRABR, hra'b'r. An early South Slav (Old Bulgarian) writer. Of his life nothing is known beyond the fact that he was a monk and lived at the end of the ninth and the beginning of the tenth century A.D. In his treatise *O Pismeneh* (On Writing), which bears witness to the literary activity of the early Slav translators of the Greek church books, Hrabr endeavored to justify the right of the Slavs to employ an alphabet of their own in preference to the Greek. It is, however, impossible to ascertain whether he refers to the Cyrillic alphabet (qv) or the Glagolitsa (qv). Consult Abicht, "Das Alphabet Chrabres," in *Archiv für slavische Philologie*, vol. xxxi (Berlin, 1910).

HRDLICKA, dlich'ka, ALŠ (1869-) An American anthropologist, born at Humpoletz in Bohemia. He went to New York City, where he studied at the Eclectic College and the Homoeopathic College. Hrdlicka made special studies of the insane, accompanied anthropological expeditions to Mexico and the Southwestern States (1898-1900, 1902, 1905, and 1910), to Florida (1906), to the Northwest (1908), to Egypt (1908-09), to South America (1910), to Siberia and Mongolia (1912), and to Peru (1913), and from 1899 to 1903 was director of the anthropological section of the Hyde expedition sent by the American Museum of Natural History to the southwestern United States and Mexico. His anthropological studies brought him to the conclusion that the bulk of the American aborigines were of Asiatic origin. He was assistant curator of physical anthropology in the United States National Museum from 1903 to 1910 and thereafter curator, and from 1901 to 1908 he was also associate editor of the *American Naturalist*. He wrote *Report on Anthropological Work in the State Institution for Feeble-Minded Children, Synacuse, N. Y.* (1898), *Anthropological Investigations on One Thousand White and Colored Children* (1899), *The Eskimo Brain* (1901), *Ancient Man in North America* (1907), *Tuberculosis among Indians* (1909), *Observations on Eskimo* (1910), *Ancient Man in South America* (1912), *Anthropological Work in Peru in 1913* (1914).

HRODBERT, rōd'bērt, SAINT. See **RUPEET**, SAINT.

HROLF, or **ROLF**, rōlf, THE GANGER. The conqueror of Normandy. See **ROLLO**.

HROSWITHA, hrōs'vē-ta, or **HROTSUITA**. See **ROSWITHA**.

HSI-AN-FO, shē'an'fō'. See **SI-NGAN-FU**.

HSIEN FENG, shyēn fūng. See **HIEN FUNG**.

HSIN-MIN-TUN, shīn-mīn-tūn'. A village of Manchuria. See **RUSSO-JAPANESE WAR**.

HSUAN T'UNG, shwān tūng' (1905-) The reign title of Pu-yi, tenth and last Manchu Emperor of China. The nephew of the preceding Emperor, Kwang-su, and the son of Tsai-feng (qv), commonly known as Prince Chun. Hsuan Tung was no doubt selected by the Empress Dowager Tzu-hsi as successor because of his youth which would insure her own continuance in power. But she died Nov. 15, 1908, the day following the death of Kwang-su. On the accession of Hsuan Tung in 1908, his father was appointed Prince Regent. A liberal policy of reform was inaugurated, but the forces operating to destroy the Manchu monarchy had proceeded too far to be checked, and the outbreak at Wuchang, October, 1911, was the signal for the revolution which ended Feb. 12, 1912, by the abdication of Hsuan Tung and the establishment of the Republic. Concerning the Emperor, it was stipulated in the terms of abdication that he was to retain his title of Emperor of Ta Ch'ing, to receive an allowance of 4,000,000 taels annually, and to have the Summer Palace, a few miles from Peking, as his permanent residence.

HUACA, wa'ka, hwa'ka, or **GUACA**, gwa'ka, colloq. wī'ka. See **PERUVIAN ARCHEOLOGY**.

HUAINA CCAPAC, wa'-na ka'pak. A Peruvian Inca. See **HUAYNA CCAPAC**.

HUALAPAI, wa'la-pī. An Indian tribe in Arizona. See **WALAPI**.

HUALLAGA, wa-lyā'ga. See **AMAZON**.

HUAMBISA, wam-bē'sa. A savage tribe of the Jivaroan linguistic stock dwelling about the junction of the Santiago and Marañon-Amazon rivers, at the head of Amazon navigation, on the Peru-Ecuador boundary. They joined the Jivaró (qv) group in their revolt against the Spanish authority in 1599 and took part in the sack of Sevilla del Oro, when 7000 Spanish women were carried off by the victors. Evidence of this admixture remains to day, the Huambisa as well as the Jivaró and several other tribes of the region being fair-skinned and bearded. They are implacably hostile, both to the whites and to the neighboring Indians.

HUANACO, wa-na'kō. See **GUANACO**.

HUANCACHELCA, wan'ka-čā-lē'ka. A department of Peru, bounded by the departments of Lima and Junín on the north, Ayacucho on the east, Ica on the south, and Lima on the west (Map. Bolivia, B 6). Its area is 9250 square miles. It belongs entirely to the region of the Cordilleras and contains only a very small portion of land fit for agriculture. The mineral wealth of the mountains consists of quicksilver, gold, silver, copper, and lead. The quicksilver mines of Huancavelica, first worked in 1566 and famous during the colonial period, are now among the most important on the globe. However, little mining is carried on because of the poor transportation facilities and the lack of capital to introduce the necessary modern methods. The vine is cultivated, and sugar cane, cotton, and cereals are produced. There is also some stock raising. Pop, 1876 (census), 103,069, 1896 (official estimate), 223,796. The capital, Huancavelica, is situated in the northern part of the department at an altitude of over 12,000 feet and has a population of about 3000.

HUANCAYO, wan-ka'yō. A town in the Peruvian Department of Junín, situated on the river Mantaro, at an altitude of over 10,000 feet.

The constitution promulgated here in 1839 remained in force till 1860. Pop., about 5000.

HUANG-HSING, or **HWANG-HSING**, hwang'-shing' (1875-1916). A Chinese general and organizer of the revolution of 1911. He was born near Changsha, capital of Hunan Province, and was educated at the college of the Liang-lu (which means the provinces of Hunan and Hupeh). Later he graduated from Tokyo University in Japan. From his youth he was active against the Manchu monarchy and incurred the hostility of the court. He fled to Japan and there continued his republican activities. A good orator and skilled organizer, he did much to enlist the prominent people of Hupeh and Hunan provinces in the revolutionary cause. During the period of preparation which preceded the outbreak he was the representative of Dr. Sun Yat-sen in China and received the money for the cause which Dr. Sun collected in Europe and America. He commanded forces at Hankow, Hanyang, and Wuchang during the revolution. At Hankow he was second in command and at Hanyang conducted a brave defense against the superior number of well-trained northern troops opposed to him. The convention at Nanking, December, 1911, which named Dr. Sun provisional President, made Huang-hsing Premier and Minister of Navy and Marine. In March, 1912, when Yuan Shih-kai became President, Huang-hsing was appointed commander in chief of the southern army. As a member and the founder of the Kuomintang, or southern party, he got into difficulties with President Yuan and was expelled from the Peking Assembly. He took the leading part in the unsuccessful revolt which followed. In 1914 he visited the United States.

HUÁNUCO, wa'-nu-kō. A department of Peru, bounded by the Department of Loreto on the north and east, Junín on the south, and Ancachs on the west (Map Bolivia, B 5). Its area is 14,027 square miles. It is exceedingly mountainous in the western part, with a general easterly slope towards the Ucayali River. It is watered by several streams, including the headwaters of the Amazon, and is covered to a large extent with thick forests. The climate is hot and moist in the east and cold in the mountainous regions of the west. The mountains contain deposits of gold, silver, and quicksilver, but the lack of good roads prevents their exploitation. Sugar cane, coffee, tobacco, and cereals are grown, and there are some manufactures of blankets and alcohol. Pop., 1876 (census), 78,991; 1896 (official estimate), 145,309. Capital, Huánuco (q v).

HUÁNUCO. The capital of the Peruvian department of the same name, situated at an altitude of nearly 6000 feet, near the river Hualaga, 170 miles northeast of Lima (Map Bolivia, B 5). It has a healthful climate, is the seat of a bishopric, and was, until 1855, the capital of the Department of Junín. Its chief industry is the manufacture of cocaine. It was founded about 1543. About 35 miles west lies Huánuco Viejo, an Inca town settled by the Spaniards in 1535 and now almost abandoned. Pop. of Huánuco, about 7500. Consult C. R. Enock, "The Ruins of 'Huánuco Viejo,'" in *Geographical Journal*, vol. xxvi (London, 1905).

HUARAZ, or **HUARAS**, wa'-ras. Capital of the Peruvian Department of Ancachs, situated on the Huaraz River, and connected by rail with the coast (Map Bolivia, B 5). It has a cool and generally equable climate, its streets are

narrow and its houses plain, and the only noteworthy buildings are the government building, a hospital, a school and two churches. It is the seat of a bishop. Set in the wall of its cemetery is a very interesting collection of stones sculptured by the ancient Peruvians and collected from the surrounding country. Pop., about 17,000.

HUARTE DE SAN JUAN, war'tā dā san hwan', or **HUARTE Y NAVARRO**, é na-vai'rō, JUAN DE DIOS (c 1530-c 1600). A Spanish physician and psychologist, who was born in Lower Navarre. He wrote a curious book on phrenology, *Examen de ingenios para las ciencias* (1575), which was extremely popular and was translated into several European languages—into English as *A Trial of Wits*. Some of his theories on education are very enlightened for the time, while others are fantastic in the extreme. Consult J. M. Guardia, *Ensayo sobre la obra de J. Huarte* (Paris, 1855), and *Biblioteca de autores españoles*, vol. lxxv (Madrid, 1873).

HUASCÁN, was-kan'. See HUASCAREN.

HUASCAR, was'kar (c 1495-1533). A Peruvian Inca, born in Cuzco. He was the legitimate heir of Huayna Ccapac, but his father allowed him to inherit only half the kingdom, leaving the other half to a younger brother, Atahualpa, of a more fierce and warlike character, who coveted the whole. A battle between the rival claimants took place near Mount Chimboazo (1532), and Huascar was defeated, falling afterward into the hands of his half brother, who compelled him to look on while the women of the royal household were tortured to death. The landing of the Spaniards was the beginning of the end for Atahualpa, whose dread that they might reinstate his brother caused him to have Huascar secretly drowned in the river Andamarca. Consult Pedro Sarmiento de Gamboa, *History of the Incas*, published by the Hakluyt Society (Cambridge, 1907), and C. R. Markham, *The Incas of Peru* (New York, 1910).

HUASCARAN, was-ka-ian', or **HUASCÁN**. See ANDES, Peru.

HUASCO, was'kō. A port of Chile, in the Province of Atacama (Map Chile, E 3). The bay is sheltered, but it has poor facilities for shipping. It has several regular lines of steamers and is connected by railway with the interior. A very fertile valley lies back of Huasco, which is rapidly being placed under cultivation. The chief exports are copper, silver, gold, pressed hay, agricultural produce, and cattle. In 1911 its exports amounted to \$174,255, and its imports to \$1,697,579. It also carries on a large coast trade. Pop., 2500.

HUASTECS, was'tēks. A detached tribe of Mayan stock (q v), on the shores of the Gulf of Mexico along the Pánuco in the states of Vera Cruz and San Luis Potosí. The language contains more archaic forms than any other of the stock, bearing out the traditional and other evidences that the Huastecs were left behind in the southward migration of the Maya people.

HUAULT DE MONTMAGNY, CHARLES J. See MONTMAGNY.

HUAYNA CCAPAC, wa'e-na ka'pak (?-1525). A Peruvian Inca, born in Cuzco. His reign began in 1483, and, being by that time an experienced soldier, he waged war against his neighbors till he had conquered the country as far north as Quito, including Puná Island, Ecuador, and as far south as Atacama, Chile. A

ferocious warrior he cultivated also the peaceful art of road making (notably the highway between Tumbez, Pachacamac, and Cuzco), while it was the magnificence of the palaces he had built which so impressed the first Spanish invaders. Huayna Capac had a harem of more than 600 members, and he decreed that his legitimate heir should share the huge kingdom with a younger brother, which led to the internal dissensions that made it fall an easy prey to Francisco Pizarro. Consult C. R. Markham, *The Incas of Peru* (New York, 1910).

HUAYULE. See GUAYULE.

HUB See HUB OF THE UNIVERSE.

HUBAL, hoo'bal. A god worshiped at Mecca, whose image, probably in human form, stood in the Kaaba (qv). He is said to have been brought from Moab by Amr ibn Luhai, of the tribe of Khuza'a, who occupied the Haram before it passed into the hands of the Koraish, and a northern origin is suggested by the occurrence of his name in a Nabataean inscription found at Hejr. When the Meccans had gained a victory over Mohammed near Medina, they shouted, "Hail Hubal!" This may indicate that the personal name of the god of Mecca was especially affected by the Koraish after Mohammed had given a new conception to the appellation *al ilahu*, or Allah (qv). The identification of Hubal with Allah, proposed by Wellhausen, is altogether probable. Oracles were secured from Hubal through the casting of arrows kept near his image. Consult Wellhausen, *Reste arabischen Heidentums*, p. 221 (2d ed., Berlin, 1907), and Noldeke, article "Arabs," in Hastings, *Encyclopædia of Religion and Ethics* (New York, 1908).

HUBALDUS See HUCBALD.

HUBAY, hoo'bô-i, JENO (1858-). An Hungarian violinist, born at Budapest. He studied the violin with Joachim in Berlin and in 1876 began to give concerts in Hungary and later in Paris. He was chief violin professor at the Brussels Conservatory (1882) and at the Budapest Conservatory (1886), succeeding his father, Charles Hubay, who was also a well-known violinist. As a composer, he ranks high, his operas *Der Geigenmacher von Cremona* (1893), *Ilener* (1892), the Hungarian *A falu rózsája* (1896), *Lavothas Liebe* (1906), and *Anna Karenina* (1915) being especially noteworthy. He also wrote a symphony, a violin concerto, and many solo pieces for violin.

HUBBARD, ELBERT (1859-1915). An American writer, also a printer and binder of books, born in Bloomington, Ill. He made himself widely known as the originator of the Roycroft Shop in East Aurora, N. Y., founded for the purpose of reviving the old handicrafts, particularly that of artistic bookmaking. He also originated and edited *The Philistine*, a periodical characterized by a curious jumble of shrewd but generally kindly philosophy, sometimes marred by vulgarity. His writings have considerable vogue among dilettantes in literature. His work includes a long series of sketches, mainly of a biographical nature, published as *Little Journeys*, many pamphlets, such as *A Message to Garcia* (1899), *Time and Chance* (1899), a graphic account of John Brown's career, *Contemplations* (1902), short essays and miscellaneous selections from Hubbard's writings, *Hollyhocks and Golden Glow* (1912); *The Book of Business* (1913). Died on the *Lusitania*.

HUBBARD, GARDINER GREENE (1822-97).

An American lawyer, born in Boston. He graduated at Dartmouth in 1841, studied law at Harvard, and was admitted to the bar in 1843. He practiced his profession in Boston until 1873, when he removed to Washington, D. C. There he was intimately connected with the organization and development of the American Bell Telephone Company. He was the founder, and for many years the president, of the National Geographic Society and was a trustee of several important educational institutions. Hubbard devoted much attention to the advancement of oral instruction among deaf-mutes. He made a large collection of etchings and engravings, which were given by his widow to the Library of Congress with a fund for additions.

HUBBARD, JOSEPH STILES (1823-63). An American astronomer, born at New Haven, Conn. He graduated from Yale College in 1843 and the next year went to Philadelphia, where he acted as assistant to Sears Cook Walker, who had built the observatory of the Philadelphia High School. Soon afterward he accepted a position offered him by General Fremont, then a lieutenant, as computer of the observations for latitude and longitude made during the explorer's journey across the continent. In 1845 he was appointed to a vacancy in the corps of professors of mathematics in the navy and was assigned to the Washington Observatory, where he remained during the rest of his life. He contributed frequently to the *Astronomical Journal* and twice, for long periods, was its editor. During his connection with the Washington Observatory he made a number of cometary investigations and important computations. He was a member of the National Academy of Sciences and of various other scientific societies.

HUBBARD, LUCIUS FREDERICK (1836-1913). An American soldier. He was born in Troy, N. Y., went to school in Granville, N. Y., learned the trade of a tinsmith, and followed it for three years in Chicago. In 1859 he started a newspaper in Red Wing, Minn., and afterward served in the Civil War, conducting himself gallantly and becoming brigadier general. Later he engaged in railroad building and milling. He was a State Senator (1872-76), Republican Governor of Minnesota (1882-87), and in the Spanish-American War commanded a volunteer brigade.

HUBBARD, RICHARD WILLIAM (1816-88). An American landscape painter, born at Middletown, Conn., and in later life a resident of Brooklyn, N. Y. He studied under Daniel Huntington and in France and England and became a member of the National Academy in 1858. His work pictures scenes in New York and Connecticut and is often graceful and pleasing but never vigorous.

HUBBARD, WILLIAM (1621-1704). An American clergyman and historian, born in England. As a child, he was brought by his parents to New England, graduated at Harvard (1642), was ordained and became assistant minister and afterward pastor of the Congregational church at Ipswich, Mass., a post which he resigned but a year before his death. He wrote, at the order of the Colonial government, which paid him 50 pounds for it, a *History of New England*, mainly compilation, which barely escaped destruction by fire when Gov. Thomas Hutchinson's house was mobbed in 1765. The Massachusetts Historical Society printed it in 1815. He wrote also *A Narrative of Troubles with the Indians* (Boston, 1677), which was for years popular in New Eng-

land and was even reprinted at the beginning of the nineteenth century at Worcester, Mass., 1801, and Roxbury, Mass., 1805. It is full of errors, but illustrates what was regarded by the writer's contemporaries as an elegant prose style. Minor works are a volume of sermons (1684) and *Testimony of the Order of the Gospel in Churches* (1701).

HUBBARDTON. A town in Rutland Co., Vt., 13 miles northwest of Rutland (Map Vermont, B 5). It was the scene of a sharp conflict, on July 7, 1777, between the rear guard of General Saint Clair's army, retreating from Ticonderoga, and a British and Hessian force under Generals Fraser and Riedesel. The Americans, under Colonels Warner and Francis, were defeated, with a total loss in killed, wounded, and prisoners of 324 men, nearly one-third their number, while the British loss was only 183. A monument commemorates the battle. Pop., 1900, 488, 1910, 455.

HUBE, hū'be, ROMUALD (1803-90). A Polish jurist, born at Warsaw and educated there, at Cracow, and in Berlin. From 1826 to 1832 he was professor of criminal law at Warsaw, then became head of a committee on revision of the laws of Poland, and was for a time professor at St. Petersburg. In 1846 and again in 1867 he went with Count Bludov on diplomatic missions to Rome. He died at Warsaw after 13 years' service in the Russian Council of State. His works include treatises on penal law (1828), on Polish criminalists (1830), *Antiquissima Constitutiones Synodales Provinciae Gnesnensis* (1836), *Loi Salique* (1867), *Histoire de la formation de la loi Bourguignonne* (1867), *Droit romain et gréco-byzantin chez les peuples slaves* (1880), and on Polish law in the thirteenth (1874) and fourteenth (1881) centuries.

HUBER, hū'bēr, EUGEN (1849-) A Swiss jurist, born at Stammheim, Canton of Zurich. He became a lecturer at the University of Bern in 1873 and professor of civil law at Basel in 1880, at Halle in 1898, and at Bern in 1902. He also served as a member of the Swiss National Council, as member of the Permanent Court of Arbitration at The Hague, and as editor of the *Schweizerisches Zivilgesetzbuch* after 1907. In Switzerland he did an especially important service in codifying the civil law and in bringing about a uniform law usage in the courts. His best-known work is the *System und Geschichte des schweizerischen Privatrechts* (4 vols., 1886-93).

HUBER, u'bār', FRANÇOIS (1750-1831). A Swiss naturalist. He was born in Geneva, inherited a love of nature as well as keen powers of observation from his father, studied physics under Saussure and chemistry with a relative. At 15 he began to lose his sight. Before he became totally blind he married a Mademoiselle Lullin. Her devotion, his father's wealth, and the keen eyes of his manservant, Burnens, made it possible for him to carry out his pioneer researches of the life and habits of honeybees. In 1792 he published at Geneva, under the title *Nouvelles observations sur les abeilles*, letters to Bonnet. These were translated into English in 1806. In later works, especially on the origin of wax and the construction of cells, Huber was assisted by his son. Among his more important discoveries were the aerial impregnation of the queen bee (see BEE), the killing of the males by the workers, the rivalry of the queens, the use of the antennæ, the origin of the propolis, and

the ventilation of the hives which supplies fresh oxygen.

HUBER, hū'bēr, HANS (1852-) A Swiss dramatic composer, born at Schönenwerd, near Olten. He studied at the Leipzig Conservatory and became well known as a music teacher, being appointed in 1896 director of the music school at Basel. His operas *Weltführung* (1894) and *Gudrun* (1896) were successfully produced at Basel, and his instrumental pieces are universally popular. He cultivated almost every branch of instrumental and vocal composition.

HUBER, JOHANNES (1830-79). A German theologian and philosopher, leader of the Old Catholics. He was born in Munich, was educated there, and became assistant professor of philosophy in the university in 1859 and a fearless opponent of the Ultramontanes. His work *Die Philosophie der Kirchenväter* (1859) was put on the Index Expurgatorius, and Catholic students were of course forbidden to attend his lectures. He actively opposed the dogma of infallibility and played a conspicuous part at the first general congress of the Old Catholics at Munich, in September, 1871. With Dollinger he wrote the famous *Der Papst und das Konzil von Janus* (1869). Among his other works are *Johannes Scotus Eugena* (1861), *Die Freiheiten der französischen Kirche* (1870), *Das Papsttum und der Staat* (1870), *Die Lehre Darwins kritisch betrachtet* (1871), *Der Jesuitenorden* (1873), *Der Pessimismus* (1876), *Die Forschung nach der Materie* (1877). Consult Eberhard Zinngebl, *Johannes Huber* (Gotha, 1881).

HUBER, LUDWIG FERDINAND (1764-1804). A German author, born in Paris. Taken to Leipzig when only two years old, he was educated in the German, English, and French languages and literatures and joined the intimate circle of Körner and Schiller. In 1798 he became editor of the *Allgemeine Zeitung* and shortly before his death, counselor of education for Swabia. He became well known for his political writings in the periodicals *Friedenspalmarien* (10 vols., 1794-96) and *Klio* (1795-98), he published two volumes of criticism under the title *Fermischte Schriften von dem Verfasser des heimlichen Gerichts* (1793), and he wrote also many dramas, of which *Das heimliche Gericht* (1790, new ed., 1795) was the best. Consult his *Sämtliche Werke seit dem Jahre 1802*, with a biography by his wife, Therese Huber (4 vols., Tübingen, 1807-19).

HUBER, VICTOR AIMÉ (1800-69). A German literary critic and social reformer, born at Stuttgart. He studied medicine and modern languages at Würzburg and Göttingen. Between 1821 and 1823 he traveled extensively, he gave up medicine and taught at Bremen, was appointed professor of the history of literature and of modern history at Rostock in 1833, of the languages of western Europe at Marburg in 1836 and in 1843 at Berlin. He was one of the best scholars of the Spanish language and literature in Germany. From 1851 to 1869 he lived in retirement in the Harz Mountains. His writings on Spanish, French, and English literature include *Die Geschichte des Cid* (1829), *Crónica del Cid* (1844), *De Primitiva Cantilenarum Popularum Epicarum (vulgo Romances) apud Hispanos Forma* (1844); *Skizzen aus Spanien* (4 vols., 1828-35), one of the best estimates of modern times, *Die neuromantische Poesie in Frankreich* (1833), *Die englischen Unversitäten* (1839-40). He was for a time a Conserva-

tive in politics and founded the journal *Janus*, but later became a Socialist. Consult Rudolf Elvers, *Victor Aimé Huber* (Bremen, 1872-74), and Eugen Jäger, *Victor Aimé Huber, ein Vorkämpfer der sozialen Reform* (Berlin, 1879).

HUBERDEAU, u'bër'dô', GUSTAVE (c1878-). A French dramatic basso, born in Paris. At the age of 17 he entered the Paris Conservatory, where he studied violin, singing, and theory, carrying off many prizes. After the completion of his studies he made his debut in Rossini's *Barbiere di Siviglia* in 1898 at the Opera Comique, of which institution he remained a member for 10 years, until his engagement for the Manhattan Opera House in New York in 1908. After the dissolution of that company, in 1910, he joined the Chicago-Philadelphia Opera. At the American premiere of R. Strauss's *Elektra* he created the rôle of Orestes. He possesses a splendidly trained voice of great volume and flexibility and is at the same time an excellent actor.

HUBERMANN, hû'ber-man, BRONISLAV (1882-). A Polish violinist, born at Czen-tochowa, near Warsaw. After some instruction from Michalowiez and Lotto, with whom his progress was nothing less than amazing, his father in 1892 took him to Joachim in Berlin. In less than a year the famous master declared the boy a finished artist. He made his debut in 1893 in Amsterdam and the same year played in Brussels and Paris. The following year Patti (qv) heard him in London and was so impressed that she engaged him to appear with her at her farewell concert in Vienna (January, 1895). There he attracted the attention of no less a personage than Brahms. In 1896 he toured the United States. While concertizing in Italy in 1903, he was signally honored when the municipality of Genoa engaged him to play in the city hall upon the famous Guarnerius formerly owned by Paganini (qv). He visited every country of Europe.

HUBERT, hû'bërt. The custodian of Arthur, in Shakespeare's *King John*. The character is taken from that of Sir Hubert de Burgh, who died in 1243.

HUBERT, u'bär', SAINT (c656-727). The first Bishop of Liège, honored as its patron and founder. There are numerous legends concerning him, but there seems no doubt that he was of noble birth and was married to a lady of rank. It is related that the apparition of a crucifix upon the head of a stag which he was chasing on Good Friday turned him to the religious life. He became Bishop of Maestricht and made so many converts in the district that he was called the Apostle of the Ardennes. He is the patron saint of the hunter and the healer of hydrophobia. His anniversary (November 3) is made the occasion of curious ceremonies in French rural districts. Several military orders are named after him.

HUBERT DE BURGH (?-1243). An English statesman. He held office under Richard the Lion-Hearted and about 1202 was made, by King John, castellan of Falaise and guardian of Arthur of Brittany, the young son of John's elder brother, Geoffrey. The story of his refusal to obey the King's orders to blind the young prince, incorporated by Shakespeare in his *King John*, is unauthentic. In the struggle between John and the barons he sided with the King, but is mentioned as one of those by whose advice Magna Charta was granted. In the same year he

was made justiciar of England. He held Dover Castle against the Dauphin Louis in 1216 and on August 24 of the following year gained a notable naval victory over a French fleet which was bringing in reinforcements to Louis. After 1219 Hubert, at first with the papal legate Pandulf, carried on the government for the young Henry III. He was a bitter opponent of the foreign party headed by Peter des Roches, Bishop of Winchester, and attempted to put an end to the system by which the wealth of the English clergy was being taxed for the benefit of the papal court. His policy in general was dictated by a twofold desire to strengthen the power of the crown and to further his own fortunes. During his terms of office he amassed vast riches through prudent marriages, as well as by arrogating to himself lucrative offices and the guardianship of wealthy heirs. Members of his family were advanced to high positions in the Church. His ill success against the Welsh about the year 1228 afforded his enemies an opportunity for undermining his influence with the King. He was dismissed from office in 1232 and charged with malfeasance, murder, and treason. Though restored to the King's favor for a short period, he never again exercised any influence in the government. He died in London, May 12, 1243. Consult William Stubbs, *Constitutional History of England*, vol. II (4th ed., Oxford, 1896), H. W. Davis, *England under the Angevins and Normans* (New York, 1905), T. F. Tout, *History of England, 1216-1377* (London, 1905).

HUBERTI, u'bär'të', LÉON GUSTAVE (1843-). A Belgian composer, born at Brussels. He won the Prix de Rome (1865) at the Brussels Conservatory and from 1874 to 1878 was director of the Mons Conservatory. He was inspector of singing in the Antwerp schools (1880-89), becoming later a professor at the Brussels Conservatory and director of the music school of St. Josse-ten-Noode-Schaerbeek. His compositions, which are of sterling merit, comprise the oratorios *Een laatste Zonnestraal*, *Bloemaiddine*, and *Willem van Oranjes dood*, the dramatic poem *Verlichting*, for organ, orchestra, soli, and chorus, a *Symphonie funèbre*, a romantic suite, many songs, piano pieces, and instrumental numbers.

HUBERTUSBURG, hû'bër'tus-burk, or **HUBERTSBURG**, hû'bër'ts-burk (Ger., Hubert's castle). A royal hunting seat, not far from Leipzig, built in 1721-24 by Augustus the Strong (Frederick Augustus I) of Saxony. Here, on Feb. 15, 1763, was signed the treaty of peace between Austria, Prussia, and Saxony, marking the conclusion of the Seven Years' War (qv). It is now a lunatic asylum.

HUBLI, or **HOOLY**, hû'bli. A town and railway junction in the Dharwar district, Bombay, British India, 90 miles northeast of Karwar on the Malabar coast (Map India, C 6). It is one of the principal cotton marts in that section of India and has manufactures of copper ware and silks. It has a fair trade in grain, salt, and agricultural produce. The chief objects of interest in the town and vicinity are the ancient Jain temples and numerous monasteries. Pop., 1901, 60,214, 1911, 61,440.

HUBNER, hup'nër, EMIL (1834-1901). A distinguished German classical scholar, born at Dusseldorf. He studied at Berlin and Bonn and then traveled widely in Italy, Spain, and England. He was professor at the University of Berlin from 1870 until his death. His contribu-

tions to classical learning, above all in the field of Latin epigraphy, were very numerous. To his influence was due an awakening of interest in classical studies in general and especially in epigraphy in Spain, which he made a favorite field of study. Among his publications the most important are: *De Senatus Populique Romani Actis* (1859), *Epigraphische Reiseberichte aus Spanien und Portugal* (1861), *Die antiken Bildwerke in Madrid* (1862), *Inscriptiones Hispaniae Latinae* (1869, supplementary volume, 1892), *Inscriptiones Hispaniae Christianae* (1871, supplementary volume, 1900), *Inscriptiones Britanniae Latinae* (1873), *Inscriptiones Britanniae Christianae* (1876), *Exempla Scripturae Epigraphicae Latinae* (1885), *Monumenta Linguae Ibericae* (1893), *Ueber mechanische Copien von Inschriften* (1881), *Grundriss zu Vorlesungen über die römische Literaturgeschichte* (4th ed., 1878), a very valuable bibliographical work, translated, with large additions, by J. E. B. Mayor, as *Bibliographical Clue to Latin Literature*, *Grundriss zu Vorlesungen über lateinische Grammatik* (2d ed., 1880), *Bibliographie der klassischen Altertumswissenschaft* (2d ed., 1889), *La arqueología de España* (1888), *Römische Herrschaft in Westeuropa* (1890), *Römische Epigraphik* (2d ed., 1892). Hubner was also coeditor of *Hermes* (1866-81) and of the *Archäologische Zeitung* (1868-73).

HUBNER, JOSEPH ALEXANDER, COUNT (1811-92), called originally **HAFENBREDEL**. An Austrian author and diplomat, born and educated in Vienna. He held various minor diplomatic positions in Paris, Lisbon, and Leipzig, and was then sent to Paris as Minister Plenipotentiary (1849). He held this post under the Republic, and under Napoleon III until 1859. After this he was Minister of Police in his own country, but did not keep that portfolio long. From 1865 to 1867 he was Ambassador to Rome and then made a tour of the world, described in *Ein Spaziergang um die Welt* (1875). His best-known work is his history of *Sixtus V* (1870). His posthumous work, *Neun Jahre der Erinnerungen eines österreichischen Botschafters in Paris unter dem zweiten Kaiserreich, 1851-59* (2 vols., 1904), which also appeared contemporaneously in French, is important.

HUBNER, JULIUS (1806-82). A German historical painter of the Düsseldorf school. He was born at Oels in Silesia, studied at the Academy School in Berlin and under Schadow there and at Düsseldorf. He first attracted attention by his picture of "Ruth and Boaz" (1825). He traveled in Italy and resided for the most part at Düsseldorf until 1839. In that year he settled at Dresden, becoming a professor in the Academy of Arts in 1841 and director of the Gallery of Paintings in 1871. He obtained the great gold medal at Brussels in 1851. Among the works of his first period are "The Fisherman" (1828), after Goethe's ballad, "Ruth and Naomi" (1833), in the National Gallery, Berlin, "Christ and the Evangelists" (1835); "Job and his Friends" (1838), in the Gallery of Frankfurt, "Consider the Lilies" (1839), and the portrait of Frederick III, in the Kaiserhalle, Frankfurt. To his second, or Dresden, period belong the "Golden Age" and "Dispute between Luther and Dr. Eck" (1866), in the Dresden Gallery, "Charles V at San Yuste", "Last Days of Frederick the Great", "Cupid in Winter", and others. He was also known as a poet.

HUBNER, KARL (1814-79). A German genre painter. He was born at Königsberg, and was a pupil of the Düsseldorf Academy. His works were especially popular in Holland and in America, where he was received with enthusiasm in 1874. His genre subjects include "The Silesian Weavers" (1844), "The Sleeping Wood Thief" (1845), "The Abandoned" (1846), "The Seizure for Debt" (1848), Königsberg Museum, "The Sinner at the Church Door" (1874), National Gallery, Berlin, "Consolation in Prayer" (1875), Düsseldorf Gallery, "The Recovery," in the Pennsylvania Academy of Fine Arts.

HUB OF THE UNIVERSE. A name jestingly given by Oliver Wendell Holmes in one of his essays to the State House in Boston as the centre of a self-satisfied community. The term is frequently shortened to "Hub" and applied to the city itself, which is popularly supposed to boast of its superior wisdom and culture.

HUBRECHT, HUBERT, AMBROSIVS ARNOLD WILLEM (1853-1915). A Dutch zoologist. He was born in Rotterdam, was educated at the universities of Utrecht, Leyden, Erlangen, and Heidelberg, was Selenka's assistant in zoology at Erlangen in 1874, in 1875-82 was in the Leyden Zoological Museum, and in 1882 became professor at Utrecht. In 1890-91 he traveled in Java, Sumatra, and Borneo, where he made embryological studies, notably of the tarsier. He visited the United States in 1896 and 1907. Honorary degrees were conferred on him by Princeton, St Andrews, Cambridge, Dublin, Glasgow, and Gießen. His most important work was in embryology and placentation of the mammals. In papers in the *Quarterly Journal of Microscopical Science* in 1883 and 1887 he put forth the theory—also held by Sir E. Ray Lankester—that the vertebrates originated in a Nemertine form, basing this on his discovery in the Nemertines of a continuous nerve sheath. *The Descent of the Primates* (1897) is the title under which were published his lectures at the sesquicentennial celebration at Princeton.

HUBSCH, HUPSH, HEINRICH (1795-1863). A German architect. After studies in Heidelberg he traveled extensively in Greece and Italy (1817-24). In 1827 he was appointed Oberbauath (inspector of buildings) at Karlsruhe. He designed the Basilica at Munich, but is chiefly known for his great work on basilican architecture, *Die altchristlichen Kirchen*, published also in French as *Monuments de l'architecture chrétienne* (Karlsruhe, 1865?).

HUBSCHMANN, HUPSH'MAN, JOHANN HEINRICH (1848-1908). A German philologist, born at Erfurt. He studied Oriental philology at Jena, Tübingen, Leipzig, and Munich, in 1876 became professor of Iranian languages at Leipzig, and in 1877 professor of comparative philology at Strassburg. He was the first to put the Armenian language in right relation to the Indo-Germanic languages. He wrote *Armenische Studien* (1883); *Das indogermanische Vokalsystem* (1885), *Etymologie und Lautlehre der ossetischen Sprache* (1887), *Persische Studien* (1895), *Armenische Grammatik* (1895), *Altarmenische Ortsnamen* (1904).

HUC, UK. EVARISTE RÉGIS (1813-60). A French Roman Catholic missionary and traveler. He was born in Toulouse, joined the Lazarist fathers in 1839, and at once went to China. After spending a few years in missionary labor in northern China, in 1844 he set out for Tibet.

With his two companions—one a Tibetan priest and the other Joseph Gabet, a brother Lazarist—he spent several months in a Tatar monastery, learning the Tibetan language, and then made his way over the desert and glaciers to Lhasa, arriving in January, 1846. Although he was favorably received by the Tibetans, he was compelled to return, the Chinese Ambassador having successfully used his influence to that end. Such was the strain on Father Huc's health that he was forced to come back to France in 1852, after visiting India, Egypt, and Palestine. He published *Souvenirs d'un voyage dans la Tartarie, le Thibet et la Chine pendant les années 1844-46* (2 vols, Paris, 1850), *L'Empire chinois* (ib, 1855), and *Le christianisme en Chine, en Tartarie et en Thibet* (4 vols, ib, 1857-58). All of these works have been translated into English. The strangeness of the things described caused them to be received with incredulity, but later travelers have established their truth, and now they are regarded as comprising one of the most authoritative accounts of Tibet. Consult Henri d'Orleans, *Le pere Huc et ses critiques* (Paris, 1893).

HUC'BALD, or HUBALDUS (c 840-c 930)

A Benedictine monk, author, and musician. He was noted for his piety and learning. He lived most of his life in the monastery of Saint-Amand, near Tournai where he was head master of his uncle's convent school. His writings include some lives of the saints, but he is best known by his treatises on music. The authorship of these is disputed, excepting *Harmonica Institutio*, a criticism of a work by Regimon de Prun. The most celebrated of them is *Musica Enchiridias*, which has now been proved to be by an unknown writer of the end of the tenth century. Other works attributed to him are *Alia Musica* and *Commemoratio Brevis de Tonis et Psalmis Modulandis*.

HUCH, hūc', RICARDA (1864-). A German novelist, born in Brunswick. She prepared for university work privately and studied at Zurich, where she took her doctor's degree in 1891. She published the plays *Der Bundes-schuur* (1891) and *Eloe* (1892), a volume of poems (1894), and two collections of tales, *Erzählungen* (1897) and *Fra Celeste* (1899). Her best work is found in her novels, which are marked by insight into the realities of life and fine stylistic passion. They include *Aus der Triumphgasse* (1901), *Vita Somnium Breve* (1902), *Von den Königen und der Krone* (1904), *Seifenblasen* (1905), *Die Geschichte von Garibaldi* (2 vols, 1906-07), *Neue Gedichte* (1907), *Risorgimento* (1908), *Gonfalonieri* (1910), *Der grosse Krieg in Deutschland* (3 vols, 1912-13). In literary criticism she published *Blutzeit der Romantik* (1899) and *Ausbreitung und Verfall der Romantik* (1902). Consult E. A. Regener, *Ricarda Huch, eine Studie* (Leipzig, 1904) and Elfriede Gottlieb, *Ricarda Huch, ein Beitrag zur Geschichte der deutschen Epik* (1914).

HUCHET, ū'shā', CHARLES A. See LABEYRIERE, COUNT.

HUCK'ABACK (probably from LG. *hukkebak*, pickaback, from *huken*, to crouch + *bak*, back). A coarse kind of linen or cotton cloth, figured somewhat like damask, it is usually employed for toweling. A kind of crash.

HUCKLEBERRY (probably a corruption of *hurtleberry*, *whurtleberry*, *whortleberry*, probably from AS. *uȳrtl*, OHG *uursala*, Ger *Wurzel*, root + *berry*). A term now generally restricted

to various small shrubs of the genus *Gaylussacia* (q.v.), family Ericaceae. In some sections, however, the term "huckleberry" is popularly given to several species of blueberries belonging to the closely allied genus *Vaccinium* of the same family. The flowers of these species have a four or



HUCKLEBERRY

five toothed calyx, four or five cleft bell-shaped corolla, with the limb bent back, and eight to ten stamens with two-horned anthers. The fruit is a four to five celled, many-seeded berry. The numerous representatives of the genus *Vaccinium*, mostly confined to the Northern Hemisphere, are common in the north of Great Britain, Europe, and throughout North America. In nature the blueberry is represented by numerous species. The plants range in size from 6 inches in *Vaccinium pennsylvanicum* to 5 to 10 feet high in *Vaccinium corymbosum*, and bear fruits from 1/8 of an inch up to 3/8 of an inch in diameter. In color they show all shades from waxen black, blue, and white, to red in one species, *Vaccinium vitis-idaea*, which is often called cranberry because of the likeness of its acid fruit to that of the cranberry.

While the blueberry has been successfully transplanted to gardens, grown from seeds and grafted, it has nowhere been cultivated in a commercial way. In certain portions of the United States wild plants are protected and cared for in order that the fruit may be secured for the canneries or markets. Recent experiments in blueberry breeding and culture show that the berries can be greatly improved in size, and that their successful culture depends especially on the use of an acid soil and on the presence of a root fungus that appears to supply the plants with nitrogen (Consult F. V. Coville, "Blueberry Culture," in *The Standard Cyclopedia of Horticulture*, New York, 1914). The "blueberry bairrens" of Maine, an area of some 150,000 acres in extent, is a notable example of the preservation of a native product from which is derived a large annual income. The annual pack from this region alone is about 30,000 cases of 24 cans each, valued at \$57,000. Besides forming a valuable commercial product when canned, the blueberry is extensively gathered and marketed for dessert purposes. Although naturally a dry, rather seedy fruit, the larger specimens

are juicy and possess a most agreeable flavor. The blueberry is also used for preserves and jellies as well as for making wine and distilled liquors.

HUCKLEBERRY FINN. Hero of the novel of the same name, by Mark Twain (S. L. Clemens), first published in 1885.

HUCKNALL TORKARD, hūk'nal tōrkārd. A town in Nottinghamshire, England, 5 miles north of Nottingham. It has coal-mining industries and large tobacco and hosiery works. Lord Byron is buried in the old parish church of St. Mary Magdalene. Pop., 1901, 15,250, 1911, 15,870.

HUDDE, hūd'de, ANDREAS (c1600-63). A Dutch commander in New Netherland after 1629. As one of the four councilors of Wouter van Twiller, director general in America for the Dutch West India Company (1633), Hudde obtained a large grant of land upon Long Island, and in 1642 he was surveyor of Manhattan. Four years later, when trouble had arisen between the Dutch and Swedish settlers on the South (or Delaware) River, he was sent to guard the Dutch West India Company's interests there, and at once entered into strife with the governor of the Swedes, who tried to stir up the Indians against him. But Hudde held his own until 1655, when the Dutch authorities sent ships to help him, and he conquered the Swedish rulers. He continued to enjoy the company's confidence and was made commander of Forts Altona and New Gottenburg (1657) as well as Colonial surveyor and parish clerk. That he was a well-educated man is evidenced by the quality of his literary remains in the Albany archives.

HUDDERSFIELD. A municipal, county, and parliamentary borough in the West Riding of Yorkshire, England, on the Colne, 16 miles southwest of Leeds. It has excellent railway and canal connections and is the chief seat of the English cloth and woolen manufacture (Map England, E 3). It also makes silk, iron, and machinery. Its industries are largely run by its own water power. Coal mining and stone quarrying are profitable industries. The town is well built and thoroughly modern, with spacious thoroughfares and fine ecclesiastical, public, and commercial buildings. The town hall, market hall, and cloth hall are noteworthy. It has a proprietary college affiliated to London University, a collegiate school, a technical school, several grammar schools, and a museum. Its municipal government is of a high order, and the corporation has been a pioneer in several economic features. Artisans' dwellings were established in 1853 for married couples and for single women as well as for bachelors. Huddersfield was the first to own and work its tramways; it owns its gas, water, and electric works and several beautiful parks, maintains free public libraries, an art gallery, public baths and washhouses, a slaughterhouse, markets, technical schools, a fire brigade, a hospital, cemeteries, and a modern system of refuse and sewage disposal. It was the first town to adopt an eight-hour labor day. It is the seat of a United States consulate. Although a town mentioned in the Domesday Book as "Odersfelt," its importance dates only from the establishment of the woolen manufacture in the eighteenth century. Pop., 1901, 95,047, 1911, 107,821.

HUDIBRAS. See BUTLER, SAMUEL.

HUDSON. A town in Middlesex Co., Mass., on Assabet River, 28 miles west of Boston, on the

Boston and Maine Railroad (Map Massachusetts, D 3). It has a public library. There are manufactures of leather, leather and rubber shoes, rubber gossamer clothing, rubber going and webbing, woolen goods, broaching machines, and wooden and paper boxes. The government is administered by town meetings. The water works, sewer system, and electric-light plant are owned and operated by the town. Pop., 1900, 5454, 1910, 6743.

HUDSON. A city and the county seat of Columbia Co., N. Y., on the east bank of the Hudson River, 28 miles south of Albany, on the New York Central and Hudson River, the Boston and Albany, and the Albany Southern railroads (Map New York, G 6). It is finely situated on the slope of Prospect Hill and has a number of noteworthy buildings, the State Training School for Girls, State Volunteer Firemen's Home, Hudson Orphan Asylum, State Armory, and the courthouse, government building, city hall, and city hospital. Public Square and Franklin Square parks and Promenade and Reservoir hills are also of interest. There are extensive manufactures of knit goods, car wheels, ale, lumber, tobacco, iron, machinery, tools, ice elevators, underwear, steel springs, mattresses, Portland cement, etc. Under a charter of 1895 the government is administered by a mayor, elected biennially, and a city council. The water works are owned and operated by the municipality. Pop., 1900, 9528, 1910, 11,417, 1914 (U. S. est.), 12,221. Hudson was settled as Claverack Landing by New Englanders in 1783, its present name was adopted in 1784, and a city charter was received in 1785. For some years the city carried on an extensive foreign trade and was an important whaling port, but its shipping was almost completely destroyed in the War of 1812.

HUDSON. A city and the county seat of St. Croix Co., Wis., on Lake St. Croix, an expansion of the St. Croix River, 20 miles by rail east of St. Paul, Minn., on the Chicago, St. Paul, Minneapolis, and Omaha Railroad (Map Wisconsin, A 4). It has saw and planing mills, interior-finish factory, breweries, and railroad-car and machine shops. The city is the centre of a region the inhabitants of which raise vegetables, small fruits, poultry, etc., for shipment. There are a well-equipped sanatorium, a Carnegie library, and a park. The water works and sewerage system are owned by the municipality. Pop., 1900, 3259, 1910, 2810.

HUDSON, CHARLES (1795-1881). An American clergyman, politician, and author, born in Marlboro, Mass. He was educated for the Church, which he entered as a Universalist in 1819, and he presided over a congregation in Westminster, Mass., until 1839. Beginning his political career in the House of Representatives of his own State, he afterward went to Congress (1841-49) and then was stationed for four years at Boston as officer of the port. He edited for many years the Boston *Daily Atlas*—a Whig organ. His books include *Letters to Rev Hosea Ballou* (1827), *History of Westminster* (1832), and a *History of Lexington* (1868, revised and continued to 1912, 1913), with a genealogical register of its families.

HUDSON, ERASMUS DARWIN (1843-87). An American physician, born at Northampton, Mass. He graduated at the College of the City of New York in 1864 and at the College of Physicians and Surgeons, New York City, in 1867. During 1867-68 he was house surgeon at

Bellevue Hospital. In 1869-70 he was health inspector of New York City, in 1870 was attending physician to the class for diseases of the eye in the outdoor department of Bellevue Hospital, was attending physician at Northwestern Dispensary in 1870-72 and attending physician to Trinity Chapel parish and Trinity Home in 1870-75. He was appointed professor of principles and practice of medicine at the Woman's Medical College of the New York Infirmary in 1872 and held that position for 10 years, and from 1882 until his death was professor of general medicine and diseases of the chest in the New York Polyclinic. He was the author of the following professional works: "Report of Pulse and Respiration of Infants," in *Elliot's Obstetric Clinic* (1872), *Doctors, Hygiene and Therapeutics* (1877), *Methods of Examining Weak Chests* (1885), *Limitations of the Diagnosis of Malaria* (1885), *Home Treatment of Consumption* (1886), *Physical Diagnosis of Thoracic Diseases* (2d ed., 1887).

HUDSON, FREDERIC (1810-75). An American journalist, born in Quincy, Mass. After a common-school education he went to New York City in 1836 and became attached to the *New York Herald*, of which he was managing editor for many years, until 1866. His long experience and diligence in collecting gave him abundant material for his *Record of Journalism in the United States from 1690 to 1872*, published in New York in 1873 and still in print, perhaps the most interesting history yet published of the rise and development of the American newspaper.

HUDSON, GEORGE (1800-71). An English speculator, known as the "railway king," born near York, the son of a farmer. He acquired a fortune as a linen draper and at the age of 27 inherited £30,000. Investing in railways, he soon carried out large schemes of annexation and extension, crushing roads and buying up embarrassed lines. In 1835 he was a town councilor, in 1836 an alderman, was three times elected Lord Mayor of York, and in 1845 was sent to Parliament. In 1847 the value of railway property fell rapidly, and it was found on investigation that Hudson was paying dividends out of capital and appropriating large sums to his personal use. He spent his last 20 years in contesting lawsuits.

HUDSON, HENRY (?-1611). An English navigator. He is first mentioned as the commander of the ship *Hopeful*, sent in May, 1607, by the Muscovy Company in quest of a north-east passage to the Spice Islands. After a voyage of four and a half months, during which he touched the coasts of Greenland and Spitzbergen and sailed as far north as 80° 23', he returned to England. In April of the year following he sailed again under the auspices of the Muscovy Company and reached Nova Zembla, attempting in vain to force a passage through the Vaigatch or Kara Strait, in the expectation of finding himself within easy reach of the Pacific. His next undertaking was made in behalf of the Dutch East India Company. In their employ he sailed from Amsterdam on March 25, 1609, with 18 or 20 men in the *Half Moon*, a vessel of about 80 tons. He made Nova Zembla, intending to try again the passage of the Vaigatch, but, his crew becoming quarrelsome on account of the cold, he directed his course towards the fortieth parallel of north latitude on the American coast because of a notion then dominant in the minds of Capt

John Smith and Richard Hakluyt that in that vicinity the Atlantic was separated from the Pacific only by a narrow isthmus. He crossed the Atlantic and sighted land in the latitude of Nova Scotia. He then sailed south as far as latitude 35° and, again turning north, carefully examined the coast up to Sandy Hook, which he reached on September 12. A month spent in exploring the Hudson River, which the *Half Moon* ascended to the present site of Albany, satisfied him that there was no passage from ocean to ocean in this part of the world and he was back in England the 7th of November. In 1610 he set out once more, this time to search for a northwest passage, under the patronage of an association of English gentlemen. He left England in April and by June 10 had reached the strait which now bears his name. Passing into the bay beyond (Hudson Bay), he spent three months exploring its coasts and islands. Early in November his vessel was frozen in. The winter seems to have been one of great suffering. Provisions were scarce, and dissensions arose among the sailors. Late in June 1611, a part of the crew mutinied, seized and bound Hudson, his son, and seven others of the ship's company, and, putting them into the small boat, set them adrift. They were never seen again. A few wretched survivors from among those on board the ship reached England. Consult the introduction to G. M. Asher *Henry Hudson, the Navigator*, edited for the Hakluyt Society (London, 1860)—this volume includes reprints of the earliest accounts of his voyages, both English and Dutch, Edgar M. Bacon, *Henry Hudson His Times, and his Voyages* (New York, 1907), *List of Books and Magazine Articles on Henry Hudson*, published by the Brooklyn Public Library (Brooklyn, 1909). H. C. Murphy, *Henry Hudson in Holland* (The Hague, 1909).

HUDSON, HENRY NORMAN (1814-86). An American Shakespearean scholar and editor, born at Cornwall, Addison Co., Vt. In early life he worked as a baker and a wheelwright. He graduated from Middlebury College, Vermont, in 1840, and then taught school in Kentucky and Alabama. He presently became an authority of considerable note on Shakespeare, lectured widely on his works, and was appointed a professor in Boston University. Among his works in this field are *Lectures on Shakespeare* (2 vols., 1848), a valuable annotated edition (11 vols., 1851-56), and *Shakespeare His Life, Art, and Characters* (2 vols., 1872). Having entered the priesthood of the Protestant Episcopal church, he was for some years editor of the *Churchman*, was rector at Litchfield, Conn., 1859-60, and served as chaplain in the Union army during the Civil War. On his return he published *A Chaplain's Campaign with General Butler* (1865). He was author also of *Sermons* (1874), *Studies in Wordsworth* (1884), *Essays in Education* (1884), and other works.

HUDSON, WILLIAM (c. 1730-93). An English botanist, born at Kendal in Westmoreland. He became an apothecary, but devoted much time to botany, entomology, and other natural sciences. He is chiefly noted for his adaptation of the Linnean system of plant classification to the flora of Britain, which he published under the title *Flora Anglica* (1762). A third and greatly enlarged edition appeared in 1798. The genus *Hudsonia* was named by Linnæus in his honor.

HUDSON, WILLIAM HENRY (1862-) An English author and professor of English literature, born in London and educated by private tutors. He was private secretary to Herbert Spencer, librarian of Sion College, London (1885-86), and later of the London City Liberal Club (1889-90) and of Cornell University (1891-92). From 1892 to 1901 he was professor of English literature at Leland Stanford Junior University, in 1902-03 professorial lecturer at the University of Chicago, and later staff lecturer in literature to the extension board of London University. His work, besides contributions to magazines, includes *The Church and the Stage* (1886); *An Introduction to the Philosophy of Herbert Spencer* (1894, new ed., 1904); *Studies in Interpretation* (1896); *Idle Hours in a Library* (1897); *The Study of English Literature* (1898); *Sir Walter Scott* (1901); *The Sphinx, and Other Poems* (1900); *The Famous Missions of California* (1901); *Rousseau and Naturalism in Life and Thought* (1903); *An Introduction to the Study of Literature* (1910); *Keats and his Poetry* (1911); *Gray and his Poetry* (1911); *Louell and his Poetry* (1911); *Milton and his Poetry* (1912); *The Story of the Renaissance* (1912); *An Outline History of English Literature* (1913); *The Man Napoleon* (1914). He also edited many English classics, notably, Goldsmith's *Vicar of Wakefield* (1898); *The Sir Roger de Coverley Papers* (1899); *Bacon's Essays* (1901); *Dryden's Essay on Dramatic Poesie* (1904); and *The Elizabethan Shakespeare*.

HUDSON BAY. A spacious landlocked gulf in the northeastern section of Canada, which may be regarded as an arm at once of the Arctic and the Atlantic Ocean (Map: North America, K 4). It communicates with the Atlantic by means of Hudson Strait and with the Arctic by Fox Channel and various passages to the north and west, which, notwithstanding the comparative lowness of their latitude, have proved less practicable for navigation than the Arctic Ocean itself. Hudson Bay extends from about lat 51° to about 64° N, a distance of about 900 miles. Its area is about 400,000 square miles. Its depth is about 70 fathoms, on the west coast there is an average rise and fall of 11 to 12 feet at spring tides. The southern prolongation of Hudson Bay bears the name of James Bay. Hudson Bay contains several islands, in addition to the large Southampton Island at its north end, but no rocks or shoals, and the region is singularly free from storm or fogs. Neither the bay nor Hudson Strait is ever entirely frozen over, but both are beset by detached floes and bergs of ice, which render navigation difficult for sailing vessels. Steamships can make the voyage up the bay and reach land from about the middle of June to the end of October. The proximity of the entrance to the Magnetic Pole causes the compass needle to be unreliable and not an aid to navigation. The west shore lies low, but the east shore is bold and rocky. Thirty rivers of considerable magnitude flow into the bay, the Nelson River being the most important. The Churchill and the Severn come next—the former having a deep though comparatively narrow mouth, which can be entered with ease by the largest ships at all tides. Though the land lying south and west of James Bay is suitable for dairy farming, and though ironstone, manganiferous iron ore, galena, and plumbago are found in other portions of the sur-

rounding territory, neither the soil, timber, nor minerals have been to any extent drawn upon. Caribou and musk ox inhabit the shores, and whale, walrus, seal, and salmon abound in the waters of Hudson Bay, and steam whalers visit it during the summer, but the only business developed lucratively is the fur trade by the Hudson's Bay Company, because of the severe long winter on the shores of the bay. The few summer months are genial and bracing. The bay was discovered in 1610 by Henry Hudson (qv).

HUDSON FALLS, N. Y. See SANDY HILL.

HUDSON-FULTON CELEBRATION. See PAGEANTS AND CELEBRATIONS.

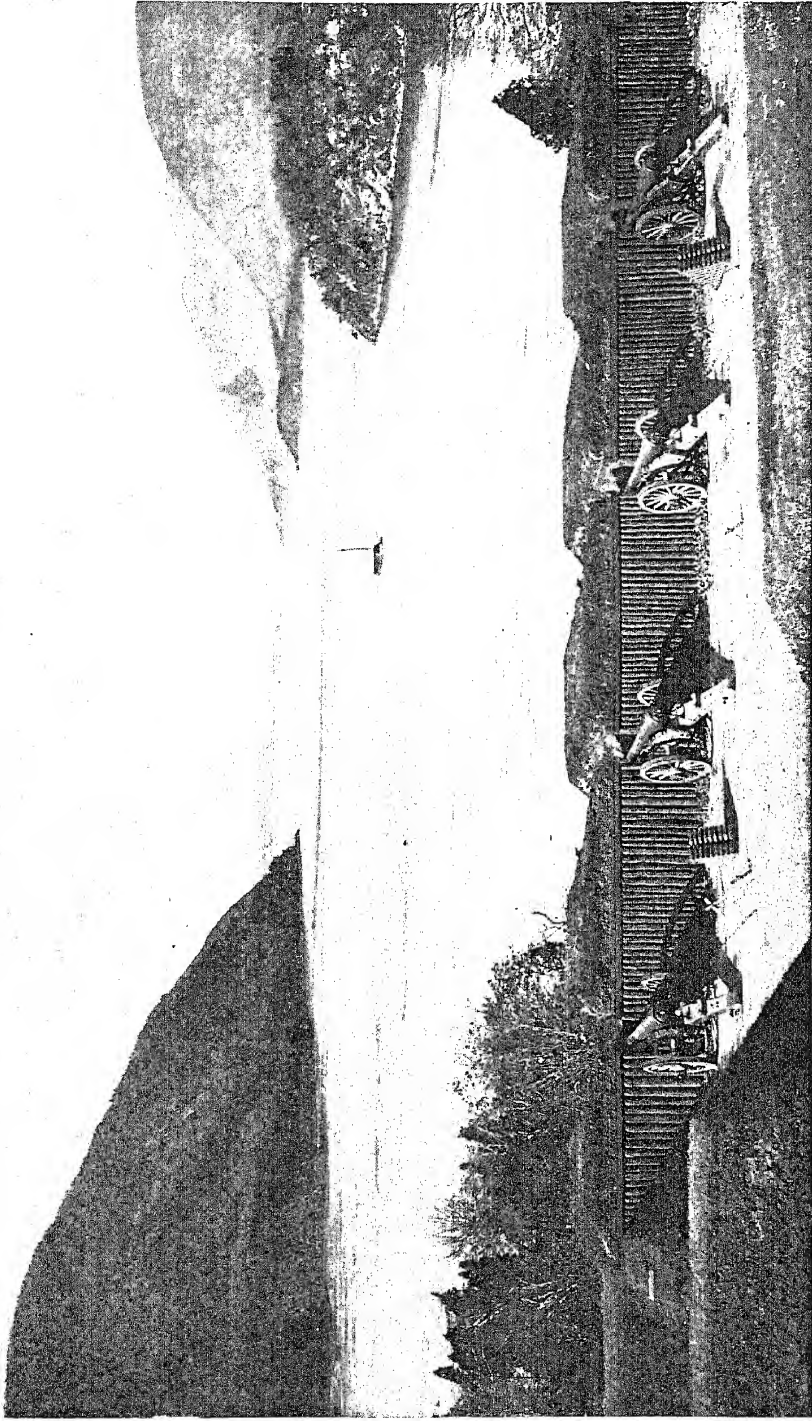
HUDSONIAN CURLEW, GODWIT, ETC. See CURLEW, GODWIT, ETC.

HUDSON RIVER. The principal river of New York State and one of the most picturesque and important waterways in the eastern United States (Map: New York, G 6). Its principal sources lie in the wildest region of the Adirondack Mountains, in Essex County, and any one of several small streams might be considered its origin, but the highest permanent body of water from which it is fed is Lake Tear-of-the-Clouds, which lies at an altitude of 4322 feet above sea level, in the centre of the triangle formed by Mounts Marcy, Gray Peak, and Skylight. After emerging from the mountains it flows almost due south until it empties into the Atlantic Ocean through New York Bay at New York City, its total length being about 300 miles.

Like the other Atlantic rivers, it flows transversely through the Appalachian ridges instead of following what would now be the natural course, along the great longitudinal valleys (See APPALACHIANS, especially under the sub-head *Drainage Development*). Accordingly its valley is in places very narrow, and its banks lined with high and steep hills and mountains, notable among which are the Highlands, 1500 feet in elevation, through which the river winds for about 16 miles, the gorge being narrowed at one point to about 1600 feet. Farther down, near the mouth, its west shore, for about 18 miles, is formed by a great dike of trap rock, the Palisades (qv). The Catskill Mountains, west of the Hudson, about 100 miles from the sea, approach to within 8 miles of the river.

The fall of the river in its upper reaches is very rapid, amounting to 64 feet per mile from Lake Tear-of-the-Clouds to North Creek, a distance of about 52 miles. From North Creek to the mouth of the Saconaga the fall is almost 14 feet per mile, and in the next 26 miles (to Fort Edward) the descent amounts to 418 feet more, 175 feet of which, however, are accounted for by the abrupt descents at Palmer, Glens, and Baker's falls.

The chief tributaries of the Hudson are the Indian, Schroon, and Saconaga rivers, above Glens Falls, Batten Kill, and Fish Creek, and the Hoosic and Mohawk rivers between there and Troy. Below Troy the tributaries include the Catskill, Esopus, and Rondout creeks and Wallkill River, from the west, and Kinderhook Creek, Jansen Kill, Wappinger Creek, Fishkill Creek, and the Croton River, from the east. The largest of these confluents is the Mohawk River (qv), which supplies more water than the main stream itself. The valley of the Hudson has a larger population in proportion to its area than that of any other large stream in the United States, excepting the Delaware River.



THE HUDSON RIVER
LOOKING NORTH FROM WEST POINT

The Hudson differs from other Atlantic rivers in that, owing to the considerable sinking or depression of the land in this region, its valley has been drowned and tide water affects the river and makes it navigable to Troy, 6 miles above Albany, or for about 150 miles. Below this point the so-called river is really an estuary or fiord, its volume being far out of proportion to its drainage area (about 13 370 square miles), though, owing to the narrowness of its valley, it still retains the aspect of a river, except for a stretch of about 20 miles between the Highlands and the Palisades, where it expands into Haverstraw Bay, about 6 miles long by $3\frac{1}{2}$ miles wide, and Tappan Sea, about 8 miles long by 4 miles wide. Above Albany and Troy the river is a small stream, obstructed by falls and rapids. It is this drowning of the Hudson valley which is one of the principal causes of the commercial supremacy of New York City, as it has made this river the only deep-water passage cutting entirely through the Appalachian system. The connection of the Atlantic with the North Central States is completed by the Erie Canal (see CANAL), which extends from Troy to Buffalo on Lake Erie.

The Hudson proper is a majestic waterway, from $\frac{1}{2}$ to nearly $1\frac{1}{2}$ miles wide, with the exceptions noted above. It is navigated by a large number of vessels of all kinds, and elegant passenger steamers ply upon its waters. The principal places on the river are Glens Falls, Cohoes, Troy, Albany, Hudson, Catskill, Kingston, Poughkeepsie (where is the only bridge between Albany and the sea), Newburgh, West Point (seat of the United States Military Academy), Peekskill, Haverstraw, Ossining (Sing Sing), Nyack, Tarrytown, Yonkers, and at the mouth of the river, New York, Hoboken, and Jersey City. Sailing craft, whose numbers formerly added so much to the picturesqueness of the river, have to a great extent disappeared. The enormous traffic on the river is facilitated by the New York Central and Hudson River and the West Shore railroads, which run along either shore of the Hudson and the Mohawk. The Hudson was discovered by Verazano in 1524, but first explored by Henry Hudson in 1609. It was called North River to distinguish it from the Delaware (or South) River, but the English named it in honor of its explorer. Its Indian name was Shatemuc. The Hudson was an important waterway in the Revolutionary War (see STONY POINT; WEST POINT), and it was on this river that steam navigation was first successfully introduced by Robert Fulton in 1807. Consult: R. S. Tarr, *Physical Geography of New York State* (New York, 1902); Edgar M. Bacon, *The Hudson River* (ib., 1902); J. B. Woodworth, *Ancient Water Levels of Champlain and Hudson Valleys* (New York State Museum, Bulletin No. 84, Albany, 1905); Barrows and Grover, *Surface Water Supply of Hudson, Passaic, Raritan, and Delaware River Drainages* (United States Geological Survey, Water Supply and Irrigation Papers, No. 202, Washington, 1907); C. Johnson, *The Picturesque Hudson* (New York, 1909).

HUDSON RIVER BEDS The term 'Hudson River slate group' was introduced by Mather in 1839 for the slates, shales, and grits, with interstratified limestones, of the Hudson River region. These were considered as lying above the Utica shale of the Mohawk valley and therefore correlated with the Frankfort and

Lorraine beds of central New York. Later the term was extended to comprise all Ordovician formations above the Trenton limestone, and this usage became established in geological textbooks. The study of the fossils, notably the graptolites, has shown that the Hudson River beds, or group, are not a unit but are composed of many zones extending from the base of the Ordovician (Schaghticoke shale) through the Beekmantown (Deep Kill shale), Chazy and Black River (Normanskill shale) into the Trenton (Canajoharie and Snake Hill beds), while the Utica and Lorraine equivalents are entirely lacking in the group. The name 'Hudson River beds' is now only used when the component horizons have not been distinguished. Consult: Mather, *Geology of New York. Report on the First District* (Albany, 1843); Ruedemann, *Hudson River Beds near Albany* (New York State Museum, Bulletin No. 42, Albany 1901); id., *The Lower Silurian Shales of the Mohawk Valley* (New York State Museum, Bulletin No. 162, Albany, 1912).

HUDSON RIVER SCHOOL OF PAINTING The earliest school of landscape painting in the United States. The name was derived from the practice of its members of depicting the scenery of the Hudson River, upon whose banks many of them lived. Although not the earliest landscape painter in the United States (see DOUGHTY, THOMAS), Thomas Cole, who lived at Catskill on the Hudson, may be called the founder of the school. This honor is shared by Asher Durand, originally an engraver, whose influence was wider and who transcribed nature more faithfully. Cole represented the romantic, Durand the realistic, side of the school. Among their followers were John F. Kensett, J. A. Richards, Worthington Whittredge, then J. F. Cropsey, Sanford R. Gifford, George Inness, F. E. Church, Bierstadt, and McEntee. Somewhat younger were Samuel Colman, William T. Richards, Homer D. Martin, Alexander Wyant, Thomas Moran, and R. Swain Gifford. These men by no means confined themselves to Hudson River scenery, F. E. Church, e.g., painted the Andes, Greece, etc., and Bierstadt, whose training was derived at Dusseldorf, the Rockies and other Western scenery. They shared the conviction that a landscape should represent a grand or romantic piece of nature. Their best work compares not unfavorably with that of contemporary English and German painters. Usually it was hard in line, overdetached in execution, thin and dry in color. The art of the school culminated in the landscapes of three great masters of landscape, George Inness, Alexander Wyant, and Homer D. Martin. Consult Samuel Isham, *History of American Painting* (New York, 1905), and the articles on the painters mentioned.

HUDSON'S BAY COMPANY An English chartered company. It was incorporated in 1670 by Charles II, who granted to a number of "adventurers," with Prince Rupert at their head, the sole right to trade with the native tribes on the shores of Hudson Bay. The company had power to establish laws and impose penalties, to erect forts, maintain ships of war, and "make peace and war with any prince or people not Christian." It started with a capital of about £110,000, and for a long time it maintained its monopoly intact. The progress made was not rapid, and by the middle of the eighteenth century the company had no more than 120 people

in its employ, but nevertheless three or four ships were sent out annually with a cargo of coarse English goods, which were sold to natives for furs and skins at rates which brought the proprietors a handsome profit. Conflicts soon arose with the French, who laid claim to the territory on the ground of an expedition made in 1656 by Jean Bourdon, who, according to Charlevoix, *Histoire de la Nouvelle France*, vol 1 (Paris, 1744), traveled from Quebec to Hudson Bay and took formal possession of the country inclosing James Bay. There is no doubt, however that the Hudson basin had been visited by English navigators long before 1656. In 1682 a trading post on the coast was surprised by the French, and in 1686 four more of the company's forts were taken. During the War of 1689-97 the same forts changed hands more than once, and by the terms of the Peace of Ryswick some of them were given to the French. It was not until the Treaty of Utrecht, in 1713, that the latter finally resigned all claims to the Hudson Bay territory. From 1713 to 1763 the company enjoyed a peaceful and prosperous but far from dazzling career. It imported annually into England about 30,000 skins, and its dividends were 8 to 10 per cent. The conquest of New France was the turning point in the company's history. When Canada became English, the vast territory of the Hudson's Bay Company became accessible from the south as well as from the sea. Trade increased tremendously, and in the next French war (1778-83), when its factories were surprised by a French squadron under Lapérouse, the company was strong enough to bear a loss of £500,000.

So profitable a monopoly could not be long enjoyed. Not only private trappers, but rival companies, entered the field, on the principle of free and open trade guaranteed to all British subjects in the Bill of Rights. Such a competitor was the famous Northwest Company, which, after years of strife amounting at times to actual war, was merged (1821) with its opponent under the name 'Adventurers of England Trading into Hudson's Bay,' for a period of 21 years. The territories of the company had been gradually extended until they reached to the Arctic on the north and the Pacific on the west. In 1859 the trade monopoly was abolished, but the claims of vested interests and property rights remained unsettled until 1869, when, in return for an indemnity of £300,000, together with a land grant of 7,000,000 acres made by the Dominion government, the company gave up all its ancient privileges and took its place on a footing with other business corporations, retaining, however, its forts or trading stations.

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HUDSON STRAIT. See HUDSON BAY

HUÉ, u'á' Capital of the Kingdom of An-nam, situated on the left bank of the Huong-

giang (in French, the Hué) River, about 10 miles above its entrance into the sea, about lat 16° 29' N and long 107° 38' E (Map Asia, M 7). It is a walled city, fortified in the beginning of the nineteenth century by French engineers after the style of Vauban. Hué consists of two parts, the city proper and the suburbs—the former being in the middle of a square island separated from the suburbs on three sides by the river and on one side by a canal. The walls, which have a circumference of about 8000 yards, are of brick and very high. The citadel is a large quadrilateral with eight gates and a bastioned front. The royal palace has yellow tiles on the roof, those of the nobles have red tiles. Inside the palace, which is kept in good order, is a museum of ancient Annamite art, mainly in gold and jade jewelry. The wall inclosing the royal palaces has three gates, the centre one being in the form of a pagoda elaborately carved and gilded, but most of the public buildings and nearly all the houses are comparatively mean and in poor repair. The official buildings of the French government are on the right bank of the river, also the houses of European officials and merchants. The population is estimated at 41,000, of which 300 are Frenchmen and 800 Chinese. Near Hué are the magnificent tombs of the old Annamite kings. The forts at the mouth of the river were taken by the French in 1883.

HUE, u, GEORGES ADOLPHE (1858--) A French dramatic composer. He was born at Versailles and gave early evidence of his musical gift. When 21 years of age, he won the Grand Prix de Rome and two years later the Prix Ciessent. During his period of study at the Paris Conservatory he was the pupil of Reber and Paladilhe. His compositions include the following operas *Les pantins* (1881), *Le roi de Paris* (1901), and *Titania* (1903). Among his orchestral works are, the symphonic legend, in three parts, *Rubezahl*, and a dramatic sacred episode, *Resurrection*. He also wrote much chamber music and numerous pieces for individual instruments. He became known as one of the most successful teachers in Paris.

HUE AND CRY. A phrase, derived from the old process of pursuit with horn and voice, used in English law in the pursuit of felons. Whoever arrested the person pursued was so far protected that he required no warrant to justify the arrest, and even if the party turned out to be no felon, no action could be brought if the arrest was bona fide. But it was not only a ground of action, but an offense subject to fine and imprisonment, maliciously and wantonly to raise the hue and cry against a person. It was the duty of all persons to join in a hue and cry, and if a person who had been robbed or knew of a robbery failed to raise the hue and cry, he was liable to fine or imprisonment or, according to some authors, to indictment. Hue and cry is now regulated in England by the Sheriffs Act, 1887 (50 and 51 Vict, c 55). *Hue and Cry* is the name given to the weekly printed list containing descriptions of persons wanted by Scotland Yard, London, and circulated among detective offices throughout the world. Consult the *Commentaries* of Blackstone and Pollock and Matland, *History of English Law* (2d ed, Cambridge, England, and Boston, 1899).

HUECO, wá'kó See WAGO

HUEFFER, huf'fēr, FRANÇOIS (1843-89) An

English musical writer and librettist, born in Munster, Germany. He studied in England and on the Continent and afterward settled in London, and became musical critic of the *Times* in 1878. He furnished the libretto for the operas *Columbia* and *The Troubadour* of Mackenzie and *The Sleeping Beauty* of Cowen. His works include an edition of the works of the troubadour Guillem de Cabestant (1868), *Richard Wagner and the Music of the Future* (1874), *The Troubadours. A History of Provençal Life and Literature in the Middle Ages* (1878), *Musical Studies* (1880), a collection of articles originally written for the *Times* and other newspapers, translated into Italian by Visetti (1883) and a translation into English of the correspondence of Wagner and Liszt. He was one of the first to advocate the cause of national English opera.

HUELEN, wā'lan (c 1540-1603). A Chilean patriot, native of Angol. In 1599 he was at the head of the forces of Araucania, mustered to repel the Spaniards, and by copying their methods and teaching his followers to ride the horses the invaders had brought to South America, was enabled to wage successful warfare against them, though no longer a young man. He was victorious at Valdivia (1599), near Concepción (1601), near Bio-Bio (1602), against the enemy with firearms and coats of mail, but his siege of Osorno failed and he died of old wounds and new before he had succeeded in capturing the fort.

HUELSEN, hui'zen, CHRISTIAN (1858-). A German classical archaeologist, born in Charlottenburg, where his father was a Gymnasium teacher and where he got his early education. He studied in Berlin under Mommsen and in Rome under Henzen. After two years' teaching in secondary schools, in 1887 he succeeded Helbig (q v) in the Royal German Archaeological Institute at Rome and held this post until 1909. His works on ancient Rome, which won him honorary degrees from Oxford and Columbia, include parts of vol vi of the *Corpus Inscriptionum Latinarum* (1882-1902), *Formæ Urbis Romæ* (1896, 2d ed, 1912), with Kiepert, *Die Thermen des Atracalla* (1898), *Forum Romanum* (1904, 2d ed, 1905, English by Carter, 1905, Italian, 1905), *Topographie der Stadt Rom im Altertum* (1907), part 3 of vol i of Jordan's great work on the topography of Rome, *Die Themen des Agrippa* (1910), *Skizzenbücher Marten van Heemskerks* (1912).

HUELVA, wāl'va. The capital of the Spanish province of the same name, situated on the deep and navigable estuary of the Odiel River, 10 miles from its mouth in the Gulf of Cadiz (Map Spain, B 4). It is a well-developed town, with a good harbor, and is a railroad centre. Among its buildings is a fine hotel built in 1883 by an English company. There are also several notable churches, that of San Pedro having formerly been a Moorish mosque. The Roman aqueduct has been restored and, after centuries of disuse, again supplies the city with water. The industries and commerce of the city have become very important, through the exploitation on a large scale of the copper mines of the province. The mining companies have built two large iron piers at the harbor, one of them costing \$780,000. The city has also large machine shops and shipyards as well as various other industries. The United States is represented by a consular agent. The city is notable

as the starting point of Columbus on his voyage to America on Aug 3, 1492. Pop, 1910, 27,699.

HUENE, hu'ne, KARL, BARON VON HOENINGEN (1837-1900). A German politician, born in Cologne and educated in Berlin. He entered the army and served in the wars of 1864, 1866, and 1870-71. He retired from the army in 1873 and, after engaging in business, became a member of the Prussian House of Deputies (1877). In 1884 he was elected to the Reichstag, where he rose to prominence as a leader of the Centre and author (1885) of the *Lex Huene* (rescinded in 1893), by the terms of which all taxes on cereals and cattle, save 15,000,000 marks, were divided among the various parochial governments of Prussia. In 1893 he lost his leadership of the Clericals by his compromise with the administration on the military budget and failed of reelection in that year and again in 1895. But until his death he remained a member of the Prussian Council of State, to which he had been appointed in 1890. He was a recognized authority on matters of finance and political economy.

HUEPPE, hup'pe, FERDINAND (1852-). A German bacteriologist, born at Hildesdorf and educated in Berlin. In 1890 he was appointed professor of hygiene in the German University at Prague. He established the fact that subterranean water is free from germs and contended that the source of infection from bacteria is the decayed organism on which the bacillus feeds. Hueppe did much to simplify disinfection and to promote inoculation with benign bacteria. He was the first to advance the theory that the power of nitrifying microbes to absorb carbonic oxide, even in the dark, is due to the oxidation accompanying the ammoniacal preparation of saltpetre. After 1906 he was chief sanitary adviser at Prague. He wrote *Die Formen der Bakterien* (1886), *Ueber die Beziehungen der Faulnis zu den Infektionskrankheiten* (1887), *Ueber den Kampf gegen die Infektionskrankheiten* (1889), *Die Methoden der Bakterienforschung* (5th ed, 1891), *Die Choleraepidemie in Hamburg, 1892* (1893), *Ueber die Ursachen der Gärungen und Infektionskrankheiten* (1893), *Naturwissenschaftliche Einführung in die Bakteriologie* (1896), *Zur Rassen- und Socialhygiene der Griechen* (1897), *Handbuch der Hygiene* (1899); *Zur Socialhygiene der Tuberkulose* (1904), *Wohnung und Gesundheit* (1912), *Sport und Reizmittel* (1913).

HUÉRCAL-OVERA, wār'kal ô-vā'ra. A town of southeast Spain, in the Province of Almería, situated in a broad and fertile valley surrounded by mountains, 16 miles from the Mediterranean coast (Map: Spain, E 4). It has straight and wide streets and several plazas, on one of which stands a handsome church. The town is connected by rail with Murcia, and between it and the coast are the silver, lead, and copper mines of the Sierra de Almagrera, upon which the prosperity of the town depends. Pop, 1900, 15,774, 1910, 17,344.

HUERTA, wār'ta, VICENTE ANTONIO GARCÍA DE LA (1734-87). A Spanish poet and critic. He was born at Zafra in Estremadura, was educated at Salamanca, and spent the greater part of his life in Madrid, where he held the office of principal librarian of the Royal Library, and where he died. He early distinguished himself by his poetic talent. His tragedy *Raquel*, founded upon the story of the love of King Alfonso VIII for the Jewess Rachel,

was received with great enthusiasm when first produced in 1778 and is still considered a work of some merit. Huerta was a most zealous but not always a wise or skillful defender of the ancient Spanish national taste against the Gallicism which then prevailed. His shafts were directed especially against the French school of dramatists and lyric poets inaugurated as a result of Luzán's crusade. As a lyric and dramatic poet, he shows great command of language and versification. His poems were published in two volumes, *Obras poéticas* (1778-79), they are accessible in the *Biblioteca de autores españoles*, vol. lxi (Madrid, 1869). Huerta edited the *Teatro español* (17 vols., Madrid, 1784-85), an unsatisfactory collection of the works of the older Spanish dramatists.

HUERTA, VICTORIANO (1854-1916). A Mexican soldier, born in the village of Colotlán, State of Jalisco, a descendant of the native and Spanish races. He secured the rudiments of an education from the village priest and when a boy determined to enter the army. His opportunity came when he was called upon to serve as amanuensis to the commander of a detachment of troops which passed through his town. His intelligence and ability attracted the general's attention, and when Huerta told of his desire to become a general, the officer took him to Mexico, and President Juárez placed him in the Chapultepec Military College. Huerta was a good student and distinguished himself in topography and astronomy. He graduated in time to take part in the battle of Tecuac (1876), which placed Porfirio Díaz in power. The next 30 years were occupied in the routine duties of the military career, in the command of minor posts, and in putting down incipient revolts. During this period he served as a member of the Geographical Survey Commission and became the best-informed man in Mexico on its geography. In 1902 he was the commander of a successful expedition against the Maya Indians of Yucatan, leaving the district pacified. For this service he was promoted to the rank of brigadier general by President Díaz, who recognized Huerta's abilities, but always distrusted him. From 1907 to 1910 he was on leave of absence and engaged in the contracting business in Monterey. He came into prominence in 1911, when he was placed in command of the army operating against the Zapatistas. The same year he was in charge of the escort which conducted ex-President Díaz on his flight from the capital. He was in active service in the army during Madero's administration, but was distrusted by the President. Difficulties arose between Huerta and Madero over the manner of dealing with Zapata; but these were adjusted, and in 1912 Huerta waged a campaign against Pascual Orozco in Chihuahua, winning a number of victories. He was recalled to Mexico, was promoted to the rank of general of division, and was offered a commission to Europe, which he refused. In February, 1913, he was placed in command of the government forces to suppress the insurrection under Felix Díaz. On February 18 he deserted the cause of Madero, forced the latter's resignation, and was made provisional President. Five days later President Madero and Vice-President Pino Suárez were murdered, revolt broke out in Sonora, and the United States refused to recognize the new government. Huerta refused to resign at the suggestion of President Wilson,

and on October 10-11 he arrested 110 members of the Chamber of Deputies, dissolved the Congress, and assumed dictatorial powers. In November he ignored the ultimatum of President Wilson demanding his elimination from the affairs of Mexico. The Tampico incident (April 9, 1914) involved Huerta in more serious difficulties with the United States and was followed by the occupation of Vera Cruz by United States marines. The offer of mediation by the "A B C" powers (Argentina, Brazil, Chile) was accepted by both sides, but meanwhile the Constitutionalists were making rapid progress against Huerta's forces. There were rumors of his resignation but on July 5 an election was held in the Federal territory, and he was chosen President by a small majority. Having reorganized his cabinet, he resigned on July 15, 1914, and Francisco Carbajal, the new Minister of Foreign Relations, became provisional President. Five days later Huerta went into exile, sailing from Puerto Mexico. Consult L. C. Simonds, "Victoriano Huerta," in the *Atlantic Monthly*, vol. cxiii (Boston, 1914), and J. de Kay, *Dictators of Mexico* (London, 1914). See *MEXICO, History*, UNITED STATES, *History*.

HUESCA, wá'ska (Lat *Osca*). The capital of the Spanish province of the same name, situated in a fertile plain on the river Isuela, 45 miles northeast by rail from Saragossa (Map Spain, E 1). It is an old town, retaining its mediæval aspect, surrounded by the ruins of its double line of ancient walls. It has a celebrated Gothic cathedral dating from the fifteenth century, in which is a magnificent alabaster reredos, representing the Passion, and the old Romanesque church of San Pedro dating from the twelfth century. There are also several old monasteries in the neighborhood, that of Monte Aragón containing in its crypt the tomb of Alfonso I. The institute for secondary education occupies the building of the old university, founded in 1354 and removed to Saragossa in 1845. In one of the vaults of this building the famous Bell of Huesca is said to have been constructed from the 16 heads, including one as the clapper, of as many insurgent nobles who were executed by command of King Ramiro II. The town is decaying, but still has some trade in wine and agricultural produce and has a few unimportant industries. Pop., 1900, 11,976, 1910, 10,147. Under the Romans *Osca* was a place of considerable importance, having a number of Greek and Latin schools and a college founded by Setorius, who here met his death at the hands of Perpenna in 72 B.C. The Moors strongly fortified Huesca, after being taken by Pedro I in 1096 it became the capital of Aragón, but was superseded by Saragossa in 1118.

HUÉSCAR, wá'skar. A city in the Province of Granada, Spain, situated 75 miles northeast of the city of that name (Map Spain, D 4). It has manufactures of flour, paper, linen, and woolen goods. Pop., 1900, 7917, 1910, 8096.

HUET, u'a', PAUL (1803-69). A French landscape painter and lithographer, born in Paris. He was a pupil of the Beaux-Arts (1820-24) and of Gros and Guérin, made his début at the Salon in 1827, and in 1831 produced an impression by sending nine oil paintings and four water colors. He received the cross of the Legion of Honor in 1841. He painted in almost every province of France, and in 1910 there was a retrospective exhibition

of his work at the Beaux-Arts. He was altogether a Romanticist, one of the impassioned school of 1830, preparing the way for Rousseau, Dupre, and the painters of Barbizon (qv). His paintings have the dramatic contrasts and 'images of Byronic poetry—now peaceful calms, now boisterous storms and tumultuous waters, with lightning flashing fiercely through grim masses of clouds. Among his paintings at the Louvre are 'Inundation at Saint-Cloud,' 'Equinoctial Tide near Honfleur,' 'Forest at Compiègne,' 'Setting Sun at Seneport.' Consult Hédard, *Paul Huet*, in the series 'Maîtres de la lithographie' (Le Mans, 1891).

HUET, PIERRE-DANIEL (1630-1721). A French Roman Catholic scholar. He was born at Caen, Feb. 8, 1630, and was educated in the Jesuit School there. He was a zealous follower of Descartes and a pupil of a Protestant Orientalist Bochart, and accompanied the latter on his visit to Stockholm in 1652. On his return to Caen he gave himself up entirely to the study of philosophy, the sciences, and the Oriental languages. As a preliminary to the translation of the text of Origen, he published his *De Interpretatione* (1661), but it was only at the end of 15 years' study that he published his edition of Origen's *Commentaria in Sacram Scripturam* (1668). In 1670 he was summoned to Paris to take part with Bossuet in the education of the Dauphin. In 1679 he published his *Demonstratio Evangelica*. He had an active part, moreover, in the Delphin edition of the classics. In 1674 he was elected a member of the French Academy. In 1676 he entered into holy orders and in 1678 was named abbot of the Cistercian abbey of Aulnay, from which place is named his work, *Almetana Quaestiones de Concordia Rationis et Fidei* (1690). In 1691 he published in Latin a work on *The Situation of Paradise* (Eng. trans., 1694), another in 1693 *On the Voyages of Solomon*, which were followed later by his work in classical geography, *History of the Commerce and Navigation of the Ancients*, in French (1716, Eng. trans., 1717). In 1685 he was named Bishop of Soissons, a dignity, however, on which he never entered, being transferred to the see of Avranches in 1692. Huet died in Paris Jan. 26, 1721. He was one of the most brilliant minds of the century, and his writings cover a field of marvelous breadth. His works were published in a collected form in 1712, and a volume of *Huetiana* appeared in 1722.

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HUFELAND, hoo'fe-lant, CHRISTOPH WILHELM (1762-1836). A German physician, born at Langensalza in Thuringia. He studied medicine at Jena and Göttingen, was professor of medicine at Jena from 1793 to 1798, was physician in ordinary at the court of Weimar, and resided at Berlin from 1798, where he was professor of therapeutics and pathology from the foundation of the university in 1810. He had a very high reputation for learning and skill as a physician, and he was equally esteemed for

his intellectual abilities and his noble and benevolent character. His published works are numerous, chiefly on medical and physiological subjects. His *Malobiotik*, or the *Art of Prolonging Life* (1706), was translated into almost all the languages of Europe. Among his most important works are *Ueber die Ursachen, Erkenntnis und Heilart der Skrofelnkrankheit* (1795), *Gute Rath an Mutter, über die wichtigsten Punkte der physischen Erziehung der Kinder* (1799), *Enchiridion Medicum* (1836).

HUFELAND, GOTTLIEB (1760-1817). A German political economist and lawyer, born at Dantzig. He studied at the universities of Leipzig, Göttingen, and Jena, where he graduated and became professor extraordinary of law in 1788 and professor ordinary in 1793. He held the professorship of law at Würzburg in 1803, but soon afterward went to Landshut. From 1808 to 1812 he was burgomaster of Dantzig, but in 1816 he returned to Landshut and in the following year went to Halle. His publications contain excellent exposition of the Kantian theories of lawmaking. These include *Versuch über den Grundsatz Naturrechts* (1785), *Lehrbuch des Naturrechts* (1790), *Lehrbuch der Geschichte und Encyclopädie aller in Deutschland geltenden positiven Rechte* (1790), *Institutionen des gesammten positiven Recht* (1798), and his best-known work on political economy, *Neue Grundlegung der Staatswirtschaftskunst* (2 vols., 1807-13).

HUFFCUT, ERNEST WILLIAM (1860-1907). An American lawyer and educator. He was born in Kent, Conn., and graduated from Cornell College in 1884 and from Cornell Law School in 1888. He practiced law in Minneapolis, Minn., in 1888-90, served as professor of law at Indiana University in 1890-92 and at Northwestern University in 1892-93, and thereafter was dean of Cornell Law School. Governor Hughes, of New York, at the beginning of his first term (1907), appointed Huffcut his legal adviser. Supposedly as the result of a breakdown due to overwork, Huffcut committed suicide. He was considered by his associates a man of very great ability. He published *American Cases on Contract* (1884, 3d ed., rev., 1913), with E. H. Woodruff, *Cases on the Law of Agency* (1896, 2d ed., 1907), *Elements of Business Law* (1905).

HUFFER, huff'fer, HERMANN (1830-1905). A German historian and jurist, born at Munster and educated at Bonn and Berlin. He was appointed professor of jurisprudence at Bonn in 1860 and in 1884 was made Privy Councillor. From 1867 to 1870 he was a member of the North German Reichstag. Besides his main work, *Diplomatische Verhandlungen aus der französischen Revolution* (3 vols., 1868-79), the following may be mentioned: *Der Rastatter Gesandtenmord* (1896), *Quellen zur Geschichte des Zeitalters der französischen Revolution*, part 1, dealing with the years 1799-1800 (1900-01), *Der Krieg des Jahres 1799 und die zweite Koalition* (1904), and the biographical writings *Aus dem Leben Heinrich Heines* (1878), *Zu Goethes Campagne in Frankreich* (1883), *Annette von Droste-Hulshoff und ihre Werke* (1887-90), *A. L. Menchen, der Grossvater des Fürsten von Bismarck* (1890), *Alfred von Reumont* (1904).

HUG, hoo'g, JOHANN LEONHARD (1765-1846). A Roman Catholic scholar. He was born at

Constance, June 1, 1765, studied at Freiburg, and in 1789 entered into priest's orders. In 1791 he was appointed professor of Oriental languages and of the Old Testament at Freiburg and in 1792 of the New Testament also. The most important fruit of his biblical researches was his *Introduction to the New Testament* (1808, 4th ed, 1847, Eng. trans. of 3d ed, London, 1827, New York, 1830). His great eminence as a biblical scholar led to his being called on to take part in the arrangement of the newly organized studies of several German universities, as at Breslau in 1811, at Bonn in 1816 at Tübingen in 1817, and again at Bonn 1818 and 1831. He died March 11, 1846. Among his untranslated works are *Erfindung der Buchstabenchrift* (1801), *De Antiquitate Codicis Vaticanæ Commentatio* (1810), *Das hohe Lied* (1813), *De Pentateuchi Versione Alexandrina Commentatio* (1818), *Gutachten über das Leben Jesu, kritisch bearbeitet von D. Fr. Strauss* (1835), and several on subjects of classical criticism, especially an interesting work on the ancient mythologies (1812). Consult A. Maier, *Gedachtnissrede auf Hug* (Freiburg, 1847), and Karl Werner, *Geschichte der katholischen Theologie in Deutschland*, pp. 527-533 (Munich, 1867).

HUGEL, hu'gel, FRIEDRICH, BARON VON (1852-) An Austrian-English writer on religion, son of Baron Karl von Hugel. He was born in Florence and was privately educated there and in Brussels. Deafness, resulting from typhus in 1871, possibly strengthened his natural inclination for the study of mysticism. In England, where he settled in 1871, he was an intimate friend of W. G. Ward and of other liberal Catholic scholars. His knowledge of the languages employed in theological scholarship was thorough and extensive, and it was acutely applied in his historical criticism of biblical documents and religious experience. He believed in the methods of the higher criticism, and he followed them with great freedom, notably in his examination of the orthodox view of the Gospel of John, but his opinions did not separate him from his church. After the death of Lord Acton (qv) Von Hugel became the foremost representative of Catholic scholarship in Britain. Besides a large number of articles on biblical criticism and the philosophy of religion in English and foreign reviews, he wrote *The Papal Commission and the Pentateuch* (1906), with Briggs, *The Mystical Elements of Religion as studied in St. Catherine of Genoa and her Friends* (1908-09), *Eternal Life* (1912-13), *Catholic Mysticism* (1914).

HUGEL, KARL ALEXANDER ANSELM, BARON VON (1796-1870). An Austrian soldier, traveler, and naturalist, born at Regensburg. He fought with the expedition against Naples in 1821 and remained there until 1824 as an attaché. He visited Greece, Crete, and Cyprus, examined the ruins of Palmyra and Baalbek, made numerous journeys through Syria and Palestine, and arrived at Bombay in 1832. Thereupon he traversed the greater part of the Deccan, ascended the Nil-Gherria Range, undertook thorough geographical researches in Ceylon, and in 1833 sailed from Madras to Australia (then New Holland). He returned to India (Calcutta) by way of the Philippines and penetrated through Bengal to the Tibetan frontier. He finally arrived at Vienna early in 1837. He contributed papers regarding his expedition

to Austrian scientific publications and to the *Journal of the Royal Geographical Society of London*, and wrote also *Kaschmir und das Reich der Siek* (4 vols., 1840-42), *Das Kabul-becken* (2 vols., 1850-52), and *Der Stille Ocean und die spanischen Besitzungen im ostindischen Archipel* (1860). Other scholars—among them Endlicher, Heckel, Fenzl, and Schott—also prepared the results of his scientific collections. He obtained a European reputation as a horticulturist and founded and became president of the Austrian Horticultural Society.

HUGER, ū-jē', BENJAMIN (1806-77). An American soldier, prominent on the Confederate side in the Civil War. He was born in Charleston, S. C., graduated at West Point in 1825, and served in topographical and ordnance duty until the Mexican War, in which he was chief of ordnance in General Scott's army. For his services he was brevetted successively major, lieutenant colonel, and colonel. From 1848 until 1860 he commanded various arsenals. Shortly after the outbreak of the Civil War he entered the Confederate service as a brigadier general and was soon promoted to be a major general, in which capacity he commanded a division in the Seven Days' Battles against McClellan, but was relieved from his command for his failure to intercept the Federal army after the battle of Malvern Hill. He subsequently served in the ordnance department in the Trans-Mississippi District.

HUGER, ISAAC (1742-97). An American soldier in the Revolution, born on Limerick Plantation, S. C., of French-Huguenot ancestry. He was educated in France, and on his return to America served in 1760 as a lieutenant of a volunteer militia company in a campaign against the Cherokees. With his four brothers he entered enthusiastically into the Revolutionary movement. He served first as colonel in the South Carolina militia organization and in January, 1779, was commissioned brigadier general in the Continental army. He took part in all the campaigns in the South, was especially relied upon by General Greene, to whom he was second in command, in his North Carolina campaign against Cornwallis in the early months of 1781, and was wounded at the battle of Guilford Court House.

HUGGINS, SIR WILLIAM (1824-1910). An English astronomer, born in London. He devoted himself to the study of astronomy and in 1856 built an observatory at his residence in Upper Tulse Hill, London, in which he mounted a telescope of 8-inch aperture and made careful drawings of Mars, Jupiter, and Saturn. His attention was first engaged in observations on double stars, but afterward he took up spectrum analysis. His first discovery in this line was presented to the Royal Society in a paper on the "Lines of Some of the Fixed Stars." He found also that some of the nebulae gave a spectrum of a few bright lines only, which showed that the light had emanated from heated matter in the state of gas, and, further, that one of the principal constituents of the gaseous nebulae is hydrogen. He concluded, therefore, that the nebulae are not simply clusters of stars too distant to be separately distinguished, but relics of the mass of glowing gas from which the solar system is supposed to have been formed by condensation. (See NEBULÆ.) He also examined the spectra of comets and found that part of the light of these objects is different

from the solar light. He also proved the existence of carbon in comets. Huggins was the first to apply Doppler's principle (*qv*) to the measurement of stellar velocities towards the solar system or away from it. See **ASTROPHYSICS**.

He also made innovations along other lines. He introduced spectroscopic photography into astronomy, which, however, was of limited use till about 1875, when the invention of the gelatin dry plate enabled the astronomer by long exposure to accumulate sufficient amount of light to obtain good pictures of celestial objects, too faint to be seen even with the most powerful telescope. Huggins also invented a spectroscopic method for studying the red prominences of the sun and proved, through a laboratory experiment, the existence of calcium in the solar prominences and chromosphere. In all his various researches Huggins was ably assisted by his wife (nee Margaret Lindsay), herself a scientist of distinction. In recognition of his services to science a number of honors were bestowed upon Huggins by various scientific bodies. He was president of the Royal Astronomical Society from 1876 to 1878, of the British Association for the Advancement of Science in 1891. He was president of the Royal Society from 1900 to 1905 and at different times received the Royal, the Copley, and the Rumford medals. Besides a number of original papers he published, jointly with Lady Huggins, in *Atlas of Representative Stellar Spectra* (London, 1899), which received the Actonian prize of the Royal Institution.

HUGH, hū (?-947). King of Provence and Italy. He was the son of Lothar, Count of Arles, and after the death of Louis the Blind (923) became ruler of Provence. In 926 he was crowned King of Italy at Pavia by the subjects of Rudolph, who were in revolt. His attempts to make himself Emperor involved him in constant war. Lombardy was invaded by the Hungarians, and an Italian rival, Berengar, finally drove him out of Italy.

HUGH, SAINT (c 1135-1200). Bishop of Lincoln. He was born at Avalon, near Pontcharra, Burgundy, on the border of Savoy, about 1135. His father was Lord of Avalon, but renounced the world when Hugh was eight years old and took his son with him into a monastery near Grenoble. In 1160 Hugh became a Carthusian monk at the Grand Chartreuse and won such high repute that he was called in 1175 by Henry II of England to put in order a monastery of the order at Witham, Somerset. His great success led to his election as Bishop of Lincoln in 1186. His moral courage made him fearless in resisting unjust demands from King or peasant, and his charity, which was boundless, endeared him to the people. So while he lived he was held in universal esteem, and when he died in London, Nov 16, 1200, he was not forgotten, and his tomb in Lincoln Cathedral became a place of pilgrimage. He is revered in the Carthusian Order next to St Bruno. His day is November 17. Consult his life, in Latin edited by Dimock (London, 1864), in English by Perry (ib, 1879), Thurston (ib, 1898), Bramley, in connection with memorial sermons on the seven-hundredth anniversary of his death (Lincoln, 1901), and by Charles Marson (London, 1901).

HUGH CAPET, hū kă'pĕt, F1 **HUGUES CAPET**, ug kă'pă' (c 930-996). King of France

from 987 to 996. He was a son of Hugh the Great, Count of Paris, and Hedwig, a sister of Otho the Great of Germany. Hugh Capet succeeded his father as Count of Paris in 956 and became thereby the real ruler of the country, though the title of King still belonged to the Carolingians. When, in 987, Louis V, the last Carolingian King of France, died without heirs, Charles, Duke of Lorraine, claimed the throne by descent, but at a meeting of the nobles and prelates of the realm at Senlis it was declared that the crown was elective, and thereupon Hugh was chosen, and became the founder of the Capetian dynasty (*qv*). Charles of Lorraine was easily defeated in the contest which ensued. In 988 he had his son Robert elected and crowned as his successor.

HUGHENDEN, hū'm-den (*Hitchendon*). A parish of Buckinghamshire, England, among the Chiltern Hills, 2 miles north of High Wycombe. It is noted for Hughenden Manor, long the residence of Benjamin Disraeli, Earl of Beaconsfield. Earl and Lady Beaconsfield are buried in the parish church, which contains a monument erected by Queen Victoria to the statesman's memory. Pop, 1901, 1728. 1911, 2134.

HUGHES, hūz, BAIL (1806-68). An American sculptor, resident for some years in New York, later in Boston. He was born in London, studied with Edward H. Bailey, and won several prizes at the Royal Academy. In 1820 he came to America and modeled a marble statue of Alexander Hamilton that was destroyed with the Merchants' Exchange in the New York fire of 1835. He modeled also the high relief of Bishop Hobart in Trinity Church, New York, and the bronze statue of Nathaniel Bowditch in Mount Auburn Cemetery, Cambridge, Mass.

HUGHES, CHARLES EVANS (1862-). An American lawyer, public official, and jurist. He was born at Glens Falls, N. Y., April 11, 1862, a son of the Rev David Charles Hughes, entered Madison (now Colgate) University at the age of 14 and remained there two years, graduated from Brown University in 1881, taught school for a year, and, having graduated with high honors from Columbia Law School (1884), was admitted to the New York bar. On Dec 5, 1888, Mr Hughes married Miss Antoinette Carter, and during the same year became a member of the law firm of Carter and Cravath, which he rejoined after two years (1891-93) as professor of law in Cornell University. In 1905 he was attorney for the Armstrong Committee appointed by the New York Legislature to investigate the financial administration of the great life-insurance companies chartered by the State and having their headquarters in New York City. His skill in uncovering the methods of these companies aroused public opinion and resulted in radical reforms. Nominated mayor of the city of New York by the Republican party in 1905, he declined to be a candidate, because of his unfinished task as counsel for the Armstrong Committee. He was nominated for Governor of New York by the Republican party in 1906 and was elected, defeating W. R. Hearst by about 60,000 votes. In 1908 he was the choice of a majority of the New York delegates to the Republican National Convention for the presidential nomination, in the same year he was reelected Governor of New York.

Governor Hughes's administration was an unceasing fight for reform. In his first message to

the Legislature he recommended (1) a public service commission law, (2) extension of the Corrupt Practices Act, (3) the Massachusetts ballot, (4) direct primaries, (5) laws for the protection of women and children in factories, (6) pure election laws. The Public Service Commission Law was passed, and the suggestion for labor laws was carried out, but the remainder of the programme was defeated by a hostile Legislature. The first drawn fight between Governor Hughes and the Legislature came over the Direct Primary Bill. After a long struggle the measure was defeated. The Governor carried the matter before the people of the State in several public addresses and called an extraordinary session for a reconsideration of the bill, but it was again defeated. Public opinion was aroused by the contest, however, and the law was finally passed, together with the Short Ballot Act, under the administration of Governor Glynn in 1913. In his annual message of 1908 Governor Hughes recommended that the statute relating to pool selling and bookmaking on race tracks be amended in accordance with the constitution of the State, so as to place these practices upon an equality with other forms of gambling. After a hard contest this measure became a law, and the race tracks were closed. On the whole the administration of Governor Hughes was impartial and progressive and won the approval of a majority of the people of the State. He resigned, Oct. 6, 1910, to become an associate justice of the United States Supreme Court by appointment of President Taft. At this post he came to be known as an advocate of a less rigid interpretation of the Constitution than had been in favor among the older of his colleagues.

HUGHES, DAVID EDWARD (1831-1900) An English-American inventor. He was born in London, but was early brought by his parents to the United States, where he subsequently received his education at Bardstow College, Kentucky. In 1850 he was made professor of music and later of natural philosophy at that college. In 1855 he took out a patent for his first important invention—the printing telegraph, which bears his name. After his telegraph was adopted in the United States, he went to Europe (1857), where the instrument was successively adopted by France, Italy, England, Russia, Germany, Austria, Turkey, Holland, Belgium, Switzerland, and Spain. Among his other inventions and discoveries may be mentioned the microphone (1878) and the induction balance (1879). His publications comprise a number of papers on electricity and magnetism.

HUGHES, EDWIN HOLT (1866-) An American Methodist Episcopal bishop and educator, born at Moundsville, W. Va. He graduated from Ohio Wesleyan University in 1889 and from the Boston School of Theology in 1892 and was pastor at Newton Centre and Malden, Mass., until 1903. In this year he was chosen president of De Pauw University—a post he held until 1908, when he was elected Bishop. In 1904 he was president of the State Teachers' Association of Indiana. He published *Letters on Evangelism* (New York, 1906), *Thanksgiving Sermons* (ib., 1909), *The Teaching of Citizenship* (ib., 1909).

HUGHES, HUGH PRICE (1847-1902) A British Wesleyan minister. He was born at Carmarthen, South Wales, and was educated

at University College, London, and the theological school in Richmond, Surrey. After occupying pulpits in Dover, Oxford, and London, he became superintendent of the West London Mission and editor of the *Methodist Times* (1885). His publications include *Social Christianity* (1889), *The Atheist Shoemaker* (1889), *The Philanthropy of God* (1890), *Ethical Christianity* (1892). Consult *Hugh Price Hughes as we Knew him* (London, 1902), *The Life of Hugh Price Hughes*, by his daughter (3d ed., New York, 1904), Walters, *Hugh Price Hughes, Pioneer and Reformer* (London, 1907).

HUGHES, JOHN (1797-1864) An American prelate, first Archbishop of New York, born in Annalohan, County Tyrone, Ireland. His parents were poor and could give him little schooling, but he gave his spare time to study. In 1816 his father came to America, and he followed in 1817 and worked as a day laborer in Maryland and Pennsylvania for three years, until he gained admission to the Roman Catholic College of Mount St. Mary, Emmitsburg, Md. There he earned distinction as a debater and also as a collector of funds for the rebuilding of the college after it was burned down. He was ordained a priest in 1826, and the same year the first of his controversial pamphlets was published, *An Answer to Nine Objections Made by an Anonymous Writer against the Catholic Religion*. After being assistant at the church of St. Augustine, Philadelphia, he went to Bedford, Pa., thence returned to Philadelphia (1827), to take charge of St. Joseph's Church, afterward took charge of St. Mary's, and was the founder of St. John's Orphan Asylum (1829). From 1833 to 1835 he published in the *Catholic Herald* his replies to Dr. Breckenridge, a Presbyterian critic of Catholicism. In 1838 he was appointed coadjutor of the Bishop of New York, four years afterward became Bishop himself, and continued his controversies upon educational, political, and religious affairs, in which his oratorical powers exerted a potent influence. One of Bishop Hughes's first undertakings was the establishment of a short-lived theological seminary at Lafargeville, Jefferson County, which was reopened at Fordham under the name of St. John's College in 1841. In 1850 he was made Archbishop, and in 1861 was sent on a special embassy to gain the friendship of France for the North in the Civil War, extending his influence in the same cause both to Ireland and Italy. He was a loyal American and a statesmanlike prelate. Two volumes of his writings, edited by Lawrence Kehoe, were published in 1865 after his death. Consult J. R. G. Hassard, *Life of John Hughes* (New York, 1866), H. A. Brann, *John Hughes* (ib., 1892), in the "Makers of America Series", Smith, *History of the Catholic Church in New York*, vol. 1 (ib., 1905), J. M. Farley, *History of St. Patrick's Cathedral* (ib., 1908).

HUGHES, RUPERT (1872-) An American writer. He was born at Lancaster, Mo., and graduated from Adelbert College (Western Reserve University) in 1892 and from Yale University (A.M.) in 1899, held assistant editorships on *Godey's Magazine*, *Current Literature*, and the *Criterion*, and from 1901 to 1905 served on the staff of the *Encyclopædia Britannica* in London and in New York. He is author of various juveniles, *American Composers* (1900), *Zal* (1905), *Excuse Me* (1911), successfully dramatized, *The Old Nest* (1912), *The Amiable*

Crimes of Dark Memling (1913) *What Will People Say?* (1914), a satire on New York life, and he also wrote a number of plays.

HUGHES, SAMUEL (1853–) A Canadian statesman and soldier. He was born at Darlington, Ontario, and was educated at the Toronto Normal School, at Toronto University, and at the Royal Military School. For several years he was a public-school teacher. In 1875–85 he was lecturer on the English language and literature in the Toronto Collegiate Institute and in the latter year took up newspaper work and until 1897 was editor and owner of the *Lindsay Warde*. He early entered the volunteer militia and in 1897 became lieutenant colonel in command of the Forty-fifth Regiment. In 1897–98 he visited Australia and New Zealand in the interest of colonial assistance in Imperial wars, and upon the outbreak of the South African War (qv) served therein (1899–1900) in the intelligence and transportation departments, his name being several times mentioned in dispatches. In 1900 he was appointed assistant adjutant general of the South African field forces. In 1902 he was promoted colonel. In 1891 he was an unsuccessful Conservative candidate for the House of Commons, but in the following year was successful. On the defeat of the Laurier administration in 1911 he became Minister of Militia in the Borden cabinet. In 1912 he instituted a Military Transport Board. Upon the outbreak of the European War, in 1914, he was foremost in organizing Canadian troops for the assistance of Britain. The first contingent of 33,000 was, in September–October of that year, assembled and sent on transports, convoyed by British warships, to different English ports and another contingent of 20,000 was sent in the early part of 1915. Hughes was also active in the movement which resulted in a further increase of about 50,000 to the Canadian armed force, nearly all of the latter number being retained for home defense. (See *WAR IN EUROPE*.) He visited England in October, 1914, and was made major general.

HUGHES, THOMAS (1822–96) An English author and politician, second son of John Hughes, of Donington Priory, Newbury, Berkshire, born at Uffington, Berks. He was educated at Rugby under the celebrated Dr Arnold, graduated B.A. from Oriel College, Oxford, in 1845, was called to the bar in 1848, and became a member of the chancery bar. In 1857 he gave to the world *Tom Brown's School Days*—a picture of public-school life, evidently written from the author's own personal experience, and recording the vivid and enduring impressions he brought with him from Rugby. It remains the best story of schoolboy life in the language. It was followed, in 1859, by *The Scouring of the White Horse*, in 1861, by *Tom Brown at Oxford*, in which the mental history of his hero is continued, with sketches of college life and incidents, and in 1869, by *Alfred the Great*. Hughes pursued meanwhile the study and practice of the law, and was appointed queen's counsel in 1869. He was active in founding the Workingmen's College, Great Ormond Street, of which he was principal from 1872 to 1883. He gained the confidence and good will of the working classes by endeavoring to promote a better understanding between masters and men and by teaching the latter the value of cooperation as a means of social elevation. At the general election for Lambeth in 1865 he was placed at the

head of the poll, the workingmen being especially enthusiastic in securing his return. In 1868 he was returned for Fiume, which he continued to represent till 1874, and always took a prominent part in debates relating to the combinations of trade-unions and the amendment of the law of master and servant. In 1880 he took a leading part in the socialistic settlement at Rugby, Tenn. Hughes also wrote *Memoir of a Brother* (1873), *Vacation Rambles* (1895), and several other works.

HUGHES, WILLIAM (1872–) An American legislator. He was born in Ireland, but coming early to the United States, was educated in the public schools and engaged in business. In 1898 he served with the Second New Jersey Volunteers in the Spanish-American War. He was admitted to the bar in 1900 and thereafter engaged in practice at Paterson, N. J. He was a Democratic member of the Fifty-eighth (1903–05) and the Sixtieth, Sixty-first, and Sixty-second congresses (1907–13), and was elected to the United States Senate from New Jersey for the term 1913–19.

HUGH OF LINCOLN, *hī'kon*, *SAINT*. A boy who is the hero of a mediæval legend. The story is told variously in the chronicles and ballads. According to one version, 24 boys were playing ball. St. Hugh of Lincoln, who kicked the ball through the window of a Jew, was enticed into the castle by the Jew's daughter, murdered, and thrown into a well, from which he addressed his mother miraculously and thus disclosed the crime. The story, based upon the belief that the Jews murdered Christian children, is found throughout the popular literature of mediæval Europe. It received the highest artistic treatment in Chaucer's *Prioresse's Tale*. Consult Child, *English and Scottish Popular Ballads*, part v (Boston, 1888).

HUGH OF LUSIGNAN, *hū'zə'nyan'*. The name of several counts of La Marche, of whom the best known is Hugh X, born before 1190, Count after the death of Hugh IX, who died at Damietta in 1219. King John of England had robbed his father of his fiancée, Isabella of Angoulême. After John's death Hugh X married Isabella, who was the mother of Henry III and styled herself Countess-Queen. During the minority of Louis IX he was one of the leading nobles who revolted against the Regent, Blanche of Castile, but was compelled to submit. In 1241 he insulted his overlord, the brother of St. Louis. The latter subdued him, but pardoned him. He took the cross in 1245, but it is not known whether he went on the crusade. The date of his death is uncertain, but his will was dated Aug. 1–8, 1248. Consult *Bibliothèque de l'École des Chartes*, vol. xvii (Paris, 1856).

HUGH THE GREAT (?–956). Count of Paris (called also *THE WHITE*). On the death in 923 of his father, Robert I, who had been elected King of France in opposition to Charles the Simple, he could have taken the title of King, but instead permitted it to go to his brother-in-law, Rudolph of Burgundy. He took the same course after the death, in 936, of Rudolph, who was succeeded by Louis d'Outre Mer, a young son of Charles the Simple. Meanwhile Hugh had assumed large estates, and, as Louis proved anything but a docile King, Hugh was forced to seek the assistance of his brother-in-law, Otho the Great of Germany, in the war that ensued. The King was captured and released after giving up to his conqueror the city

of Laon Louis immediately renewed the struggle, and this time was victorious. Peace was proclaimed in 950. Four years afterward Hugh again had the opportunity to make himself King, on Louis's death (954), but he favored the election of Lothair and in reward for his services was invested with the duchy of Aquitaine. It was his son, Hugh Capet, who ascended the throne 30 years later. Consult Lavissee, *Histoire de France*, vol. II, part 1 (Paris, 1903).

HUGH THE GREAT (1057-1101) Count of Vermandois, the second son of Henry I of France. He joined the First Crusade (1096) and continued with the army until after the capture of Antioch, in 1098. He was then sent by the leaders on an embassy to the Emperor at Constantinople. From there he returned to Europe. Later he joined the Crusade of 1101 and died near Tarsus. There seems to have been no reason for his being called 'The Great,' except that the Latin chroniclers so translated the French word *Maines*, meaning 'the younger.' Consult Hagenmeyer, *Inonymi Gesta Francorum* (Heidelberg, 1890).

HUGLI, or **HOOGLY**, hū'g'li The westernmost and principal deltaic channel of the Ganges, British India, formed by the junction of the Bhagirathi, the Jalangi, and the Churni—known as the Nadiya rivers. It is 125 miles long, the estuary, as far as Saugor Roads, measuring 35 miles more. It is the most available for navigation of all the channels by which the Ganges reaches the sea and is commercially the most important. In the dry season the tide is felt as high as Chandernagar, 17 miles above Calcutta. During the southwest monsoon the Hugh is subject to a bore 7 feet high, often ascending at the rate of 22 miles an hour. Ships drawing 26 feet of water can ascend to the port of Calcutta. The entrance of the river is much encumbered with shoals, and dredgers are constantly employed in maintaining a clear channel. The river above Calcutta is not regulated and is no longer navigable because of silting.

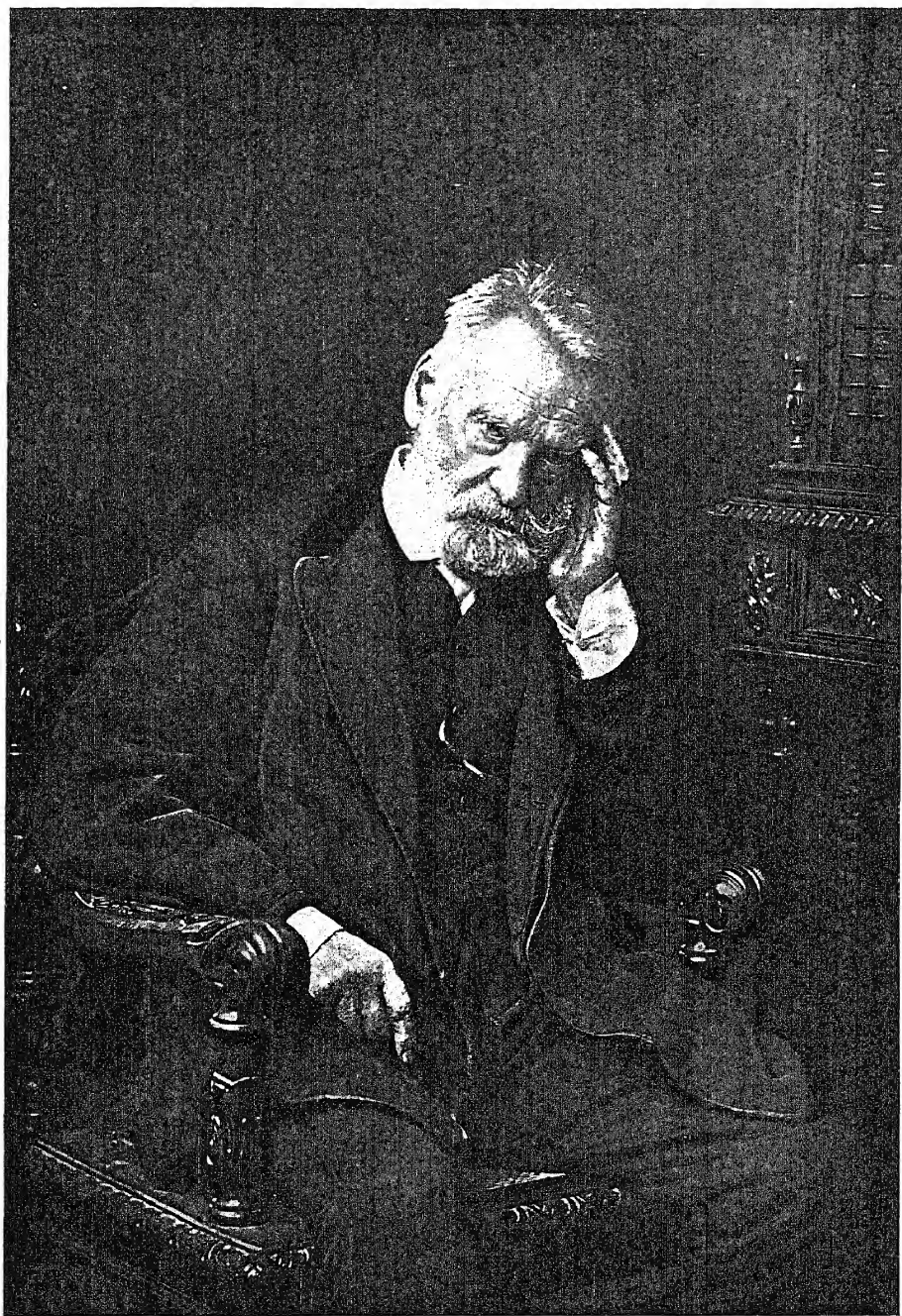
HUGLI, or **HOOGLY**. A city and river port of Bengal, British India, capital of a district of the same name, on the right or west bank of the river Hughli, 24 miles north of Calcutta. (Map India, F 4) The city was founded by the Portuguese in 1537. Chinsura (qv), which now forms a part of it, was founded by the Dutch. Its educational institutions include Hughli College, a Mohammedan college, and several high schools. It is also the seat of an extensive military cantonment. Its chief products are jute bagging, bags, and oil, but both population and trade have declined rapidly. Pop., 1901, 29,383.

HUGO, hū'gō A city and the county seat of Choctaw Co., Okla., 125 miles northeast of Dallas, Tex., on the St. Louis and San Francisco Railroad and on the Kiamichi River. (Map Oklahoma, F 4) It has railroad repair shops, cotton gins and compresses, cottonseed-oil, saw, and planing mills, a handle factory, and creosote works. Hugo was founded in October, 1901, and is governed by a mayor and eight aldermen. The water works are owned by the city. Pop., 1900, 2676, 1910, 4582.

HUGO, hū'gō, GUSTAV VON (1764-1844) A German jurist, born at Lorrach, Baden, and educated in law at Göttingen. After acting as tutor to the Prince of Anhalt-Dessau (1786),

he became professor of law at Göttingen (1788). In 1819 he was made Privy Councillor. He made important investigations of the sources of Roman law. He was, together with Savigny and Haubold, one of the founders of the historical method in jurisprudence. He edited *Ulpian's Fragmenta* (1788), translated Gibbon's chapter on Roman law as *Uebersicht des römischen Rechts* (1789), *Pauli Sententiae Receptae* (1796), and *Jus Civile ante-Justinianum* (1815). But his most important labor was his own book, *Lehrbuch eines civilistischen Kurses* (7 vols., 1792-1821), and his *Civilistisches Magazin* (1790-1837), with its supplement, *Beiträge zur civilistischen Bucherkennntnis der letzten vierzig Jahre* (1828-45). Consult Eyssenhardt, *Zur Erinnerung an Gustav Hugo* (Berlin, 1845).

HUGO, hū'gō, Fr. pron u'gō, VICTOR MARIE (1802-85) The greatest French poet of his century, a distinguished dramatist, novelist, essayist, and politician. His first volume appeared in 1822. For nearly two-thirds of the century he was a leader in French literature, for the greater part of that time preeminently the leader. He represents the supreme reach of an individualistic and Romantic movement. Besançon, his birthplace, had once been a Spanish city—a significant fact, for his work often shows Spanish influence. His father was a distinguished officer of the Republic and Empire, his mother the daughter of a sea captain of Nantes, of Royalist and Catholic sympathies. With her the child lived in Paris till 1811, when General Hugo summoned his family to join him in Madrid, whence he was constrained to send them back in 1812, as King Joseph's cause was growing desperate. The impressions of this year left deep marks on many of Victor's works, notably *Bug Jargal*, *Hernani*, *Ruy Blas*, and *Torquemada*. Afterward, until the fall of the Empire, he was once more with his mother in Paris in the abandoned convent of Les Feuillantines, which appears prominently in *Les misérables*. Set at technological studies by his father, he aspired at 14 "to be Chateaubriand or nothing," wrote a Miltonic *Déluge*, and planned dramas, epics, and operas. At 15 he competed for an academic prize, winning honorable mention and some minor literary patronage. Two years later (1819) he won three prizes at the poetic competition (*Jour de gloire*) of Toulouse. In the same year he founded a fortnightly literary journal, *Le Conservateur Littéraire*, the failure of which, with the withdrawal of his allowance from his father, reduced him to a poverty that gave materials for the Marius episodes in *Les misérables*. It was in the *Conservateur* that he wrote the first draft of the novel *Bug Jargal*, a story of Haiti, of great promise and weird power. *Bug Jargal* appeared in its final form in 1826. It was enlarged especially by the introduction of the dwarf Habibrah, whose dramatic death is imitated later in that of Claude Frollo, in *Notre-Dame*. His brother, Abel, generously helped him to print *Odes et poésies diverses* (1822), which paid him 700 francs and caused King Louis XVIII to grant him a pension of 1500 francs, increased later to 3000. On the strength of this he married (October, 1822) and thereafter enjoyed a happy domestic life. These verses, in their brilliant rhetoric and richness of rhythmic melody, had been approached in that generation only by Lamartine's *Méditations*. They show an ardent royalism, a per-



VICTOR HUGO
FROM A PHOTOGRAPH

functory, and sonorous religiosity, and an intense political passion, on which Napoleon was already beginning to exercise a fascination that declared itself openly in the superb *Ode on the Vendôme Column* (1827)

The next few years were occupied with an extravagantly Romantic novel, *Han d'Islande* (1823), and with literary journalism. From July, 1823, to June, 1824, appeared *La Muse Française*, the organ of the First Cenacle (qv). In 1826 appeared *Nouvelles odes et ballades*, whose preface was a sort of literary manifesto of romanticism and of the First Cenacle. Versification and rhythm here begin to show an aggressive individuality, and several poems indicate that sympathetic study of the mediæval mind which is associated with French romanticism. Hugo was recognized as the Romantic leader and asserted and confirmed that position by *Cromwell* (1827). As early as 1826 the Odéon Theatre had offered hospitality to an English company, in which were Charles Kemble and Miss Smithson. This company played *Othello*, *Romeo and Juliet*, and *Hamlet*, all of which were enthusiastically greeted by the new French school. Indeed, Kemble and his companions did not leave the Odéon till July, 1828. *Cromwell* begins with an elaborate preface full of dramatic observations, more opportune than new, but they now became the rallying point of a school who thought "the drama the only complete poetry of our time, the only poetry with a national character." This school demanded for the drama an unconventional vocabulary and a mingling of tragic and comic, to show more fully the irony of destiny, thus unconsciously following Diderot (qv), while attempting to follow nature. In all Hugo's dramas the lyric element tends to delay the dramatic effect. *Hernani* and *Ruy Blas* alone are still played in France.

Cromwell was followed by a drama taken from Scott's *Kenilworth*—*Imy Rohsart* (1829), a failure—and *Marion Delorme*, which the censorship forbade the stage till 1831. In January, 1829, appeared a volume in prose, *Le dernier jour d'un condamné*, which recounts the mental agony of a man on the eve of his execution and is a plea for the abolition of capital punishment. In the same year Hugo published *Les orientales*, a collection of poems containing some of the most striking pieces of metrical art in the world. They were followed by the long-contested triumph of *Hernani* and of romanticism on the French stage (1830), after Hugo had vainly tried to bring about the performance of *Marion Delorme*. For nearly 100 days, from February 26 to June 5, the battle raged nightly at the Théâtre Français, but no further organized effort was made to resist the retrograde evolution of the Romantic drama till it collapsed with Hugo's *Les Burgraves* in 1843. The situation in *Hernani* is strained and dramatically unreal, the sentiment is mawkish, the oratory grandiloquent, but a throbbing life and intensely expressed emotion maintain the interest, though this is a lyric rather than a dramatic one. The same qualities and the same defects, with more strained antithesis of grotesque and sublime, tragic and comic, foul and fair, characterize *Marion Delorme* (1831). They characterize also *Le roi s'amuse* (1832), the prose dramas, *Lucrèce Borgia* (1833), *Marie Tudor* (1833), *Angelo, tyran de Padoue* (1835). They reach their height in *Ruy Blas* (1838) and

become most conspicuous in *Les Burgraves* (1843). Hugo's conceptions were too grandiose to be reconcilable with the limitations of the drama. He gave up the effort and turned to politics. But these 16 mainly dramatic years had produced work of great value in other fields—the novel *Notre-Dame de Paris* (1831) with its Gothic intensity of pathos and its marvelous reproduction of the Paris of Louis XI, the quixotic but eloquent *Claude Gueux* (1834), a plea against capital punishment, the *Feuilles d'automne* (1831), *Chants du crépuscule* (1835), *Voix intérieures* (1837), *Les rayons et les ombres* (1840)—four collections of poems that show growing democratic sympathies and satiric power, a deepening communion with nature, and a generous warmth of universal sympathy, a little shallow in its breadth, that was to give the keynote to his political activity of the next decade.

The 10 years from 1843 to 1853 from *Les Burgraves* to *Les châtiments*, count no literary work of import, but they mark a vital change in the mind of Hugo that affects all the work to follow. Till 1843 drama had taken the first place. From 1853 fiction becomes more prominent, poetry intermittent, with occasional political writings. Hugo sees that his power is essentially lyric and gives this a dominant place even in prose fiction. Through all there is a new earnestness, born in part of the death of his daughter, Leopoldine, and her young husband (1843), in part of a vague yet intense enthusiasm for the Socialistic ideas of Fourier and Proudhon which drew him into a political whirlpool and made him a revolutionary member of the Constituent Assembly of 1848. As a practical politician, then and always, Hugo was a failure. He favored the ambition of Louis Napoleon till Louis ceased to favor his own advancement, he was an advocate of several hopelessly unpractical schemes, and an unconscious convert to the caressing flattery of Emile de Girardin. Napoleon's coup d'état of 1851 saved Hugo from himself. It made a martyr and hero out of a visionary who was distrusted as a turncoat. In his eloquent *Histoire d'un crime* (finished in 1852 and published in 1877), he shows unconsciously how his efforts to organize resistance to the usurper were distrusted by his fellow Republicans. He fled to Brussels, whence he was urgently requested to move on to England, and resided first in Jersey, then in Guernsey, as near France as possible consistently scorning every offer of amnesty till the collapse of the Second Empire brought him back to share the darkest days of the Terrible Year (1870-71).

These years of exile steeled his mind, and his genius was fired by what seemed his country's shame. In 1852 appeared the fierce and scurrilous *Napoléon le Petit*, a foretaste of *Les châtiments* (1853) in which the satiric unites with the lyric genius to produce a classic that will survive for generations the Empire that fired Hugo to a white heat. To calmer hours we owe *Les contemplations* (1856), a collection of lyrics closing in a noble strain, and the first of four volumes of *La légende des siècles* (1859, 1877, 1883), the high-water mark of his achievement in lyrical epic. In 1862 the long-heralded *Les misérables* appeared on the same day in 10 languages—an event till then unparalleled in the annals of letters. The 10 volumes of this vast romance reveal Hugo no longer, as in

Notre-Dame, an evoker of the past, but with eyes on the present and heart in the future. It lacks continuity and proportion. It is a chaos of eloquent special pleading, political reminiscences, Socialistic prophecies, bad psychology, grotesque situations, false pathos, and descriptions wonderfully vivid and absorbing. In the hurly-burly of this lyric-epic novel we find most of the virtues and all the intellectual vices of Hugo. Its value lies, not in its thought, but in its emotion, its lyric cry, and its epic power of description. On the development of fiction it had no influence, for it belonged to a type already outworn. The same may be said of *Les travailleurs de la mer* (1866), in which the descriptions are superb and the subject petty. *L'Homme qui rit* (1869), an historical phantasmagoria of the English court of Queen Anne and an unmitigated failure, closes the fiction of the exile. Meanwhile Hugo's poetic muse had had her Indian summer in *Chansons des rues et des bois* (1865). But as the Empire tottered to its fall, his inauspicious interest in politics became once more dominant. He wrote much for *Le Rappel*, a radical journal, founded by his sons and son-in-law, but revealed once more, in 1870, the hopelessly unpractical nature of his political ideas, alike as a prophet of the people and as a member of the National Assembly at Bordeaux in 1871. He resigned his seat in March and went to Brussels, where he barely escaped being mobbed, owing to his defense of the Paris Commune. He was expelled from Belgium and soon after returned to Paris. Here he failed signally in the elections of 1872, though he was elected life senator in 1876. But if he might not be a tribune, he was already the poet laureate of the Third Republic. Of *Les châtiments* 100,000 copies were sold within a year, several plays, notably *Ruy Blas*, were revived with success, and he rose to the new occasion in *L'Année terrible* (1872), a noble volume of patriotic verse that made a French critic exclaim, with just pride, that Germany had no such poet to sing her victory as France to glorify even her disaster.

Hugo was now past 70, but it is too early to speak of his decline. He could pose as old, indeed, in the poems of *L'Art d'être grand-père* (1877), but *Quatre-vingt-treize* (1874) is the most virile of his novels, with more intensity of action and a truer tragic catastrophe than *Notre-Dame* or *Les misérables*, though by no means without their faults and its own. The second part of *La légende des siècles*, if inferior to the first, is still grand, there are passages of primary quality in *Les quatre vents de l'esprit* (1881), *La pitié suprême*, and even in the *Philosophic Poems* (*Le pape, Religions et religion, L'Ane*, 1878-80), the drama *Torquemada* (1882) is vigorous at least by starts, and in the posthumous volumes (*Le théâtre en liberté, La fin de Satan, Toute la lyre*) one comes constantly on verses that bear his unmistakable mint stamp.

He died in Paris, May 22, 1885. His great age, reaching out into a new generation from an epoch that had passed away and was indeed more foreign to that day than to our own, could not but impress popular imagination, the more so as his talent, his manner, and his personal physique had something of the monumental and grandiose. Thus his death stirred an unparalleled wave of popular feeling. His body lay in state beneath the Arc de Triomphe.

His funeral became a pageant that royalty might envy and could not equal. The relics of St. Genevieve, the patron saint of Paris, were removed from the Pantheon that it might receive the popular hero.

Despite his own belief, Victor Hugo had no new or deep theories of life. He was the confident of his century, "the sonorous echo in the middle of things." Personally he was vain and rather ignorant, if we compare his knowledge with his pretensions. But he is Olympian in his defects—Zeus, Apollo, and Hephaestus turned into one. His convictions are not important. He thinks to proclaim an oracle and reiterates a commonplace. But he is perhaps the greatest compeller and gatherer of words, the greatest master of language, that we know, a great writer rather than a great author and therefore the more sure of an enduring democratic fame. He has formed the rhetorical and poetic taste of three generations of French youth. All schools of French verse that have arisen in the last half century have united to call him their father.

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HUGO OF FLAVIGNY, fla-vé'nyé' (1064-c.1140). A Franco-German monk and scholar, born in Verdun. He was educated in the monastery of St. Vannes, becoming a Benedictine monk, and afterward went to Dijon, where about 1090 he began his *Chronicle*. In 1095 he went to England and a year later became abbot of Flavigny. He was obliged to leave his abbey in 1099 and, though reinstated in 1100, was again forced to leave it by the hostility of Norgaud, Bishop of Autun, and retired to Verdun. His *Chronicle* is of value for its ac-

count of the last years of the eleventh century and extends from the birth of Christ to 1102. The original manuscript was in the possession of the late Sir Thomas Phillipps, the antiquary, and was one of the great Meerman collection before he bought it. It was published by P. Labbe in *Bibliotheca Manuscriptorum Nova* and in the *Monumenta Germaniae Historica*.

HUGO OF SAINT-VICTOR (1096-1141)

A French monk, mystic, and theologian, born in Saxony or Flanders. He was educated in the monastery of Hamerleve in Saxony and became monk in the abbey of Saint-Victor, near Paris. Until the middle of the thirteenth century his works were very popular. In his treatment of most of the general questions of theology he kept to the beaten path, but his views on psychological questions were original. There has been much discussion as to the authenticity of certain writings attributed to him. In *Les œuvres de Hugues de Saint-Victor* (1886) M. Haureau gives a list of those about which there seems little doubt and disregards many theretofore considered his. Hugo's most famous book is *De Sacramentis Christianae Fidei*. An excellent edition of his works was published at Venice in 1588.

HUGO VAN DER GOES, hū'gō vān dēr gōōs (?-1482). An eminent painter of the early Netherlands school. He was probably of Dutch origin, born at Goes (Zeeland), whence his name. Very little is known of any but the last few years of his life. The assumption that he was a pupil of Jan van Eyck is impossible for chronological reasons, and, although he was influenced by that master's work, his art more nearly resembles that of Dirk Bouts, for he probably received his earliest training in Holland. He practiced chiefly at Ghent, where his name is first inscribed in the painters' guild in 1467. During the following year he took part in the decorations for the festivities which marked the marriage of Charles the Bold to Margaret of York at Bruges. In 1468-69 his name is twice mentioned as a decorator in the services of the city of Ghent, where he was dean of the painters' guild from Christmas, 1473, to 1475. Soon afterward he retired to the priory of Roendael, near Brussels, of which his brother Nicolas was also an inmate, and where he died in 1482. The most celebrated of his works at Ghent was a decoration painted in oil on the wall of a patrician's house, representing the story of Abigail. It survives in several copies, the best being in the Novak Gallery, Prague. According to the legend the fair Abigail of the painting was his fiancée, while David was the painter himself, and it was the loss of this lady which led him to enter the convent. A fellow novice has recorded in the cloister chronicle the story of Brother Hugo's last years. Many illustrious visitors, including the Archduke Maximilian, came to the convent to see his pictures or to be portrayed by him, and Hugo was permitted to frequent the guest chamber and join in their feasts, at which he indulged too freely in wine. He was subject to frequent attacks of melancholy, particularly regarding his painting. While returning from a pilgrimage to Cologne made some time after taking the vow, he was stricken with a mental malady which caused him to imagine himself a son of perdition. He did not recover his reason until shortly before his death, in 1482.

By far the most important of his surviving works is the Portinari altarpiece, painted about 1476 for Tommaso Portinari, agent for the Medici at Bruges. The central panel represents the Madonna adorning the Christ Child, attended by wonderfully realistic shepherds and delightful angels. The left wing, Tommaso and his two sons under the protection of their patron saints, Anthony and Matthew, the right wing, his wife and daughter with Saints Margaret and Mary Magdalen. For 400 years the altarpiece hung in the hospital of Santa Maria Maggiore, Florence, until it was purchased in 1898 for 900,000 francs by the Italian government and placed in the Uffizi Gallery. It exercised a strong influence upon Italian painting of the later fifteenth century, particularly upon Ghirlandajo and Lorenzo de' Credi. Among the few other paintings which can with certainty be ascribed to Van der Goes is a small triptych the panels of which, now separated, are in the Imperial Gallery, Vienna. One of these represents the "Fall of Man," in which the nude is treated with greater freedom than had previously been done, the others are the "Bewailing of Christ" and "St. Genevieve." The "Death of the Virgin," in the Town Hall of Bruges, probably belongs to his later period. Hugo van der Goes was the most important painter of the generation following the Van Eycks. His works are characterized by ambitious design and by an attractive realism, less monumental but more intimate than that of the Van Eycks. His treatment of light and shade, as seen in the Portinari altarpiece, foreshadows that of the great Dutch masters of the sixteenth and seventeenth centuries, and his landscapes are particularly good. Consult Wanters, *Hugues van der Goes* (Brussels, 1872), Voll, *Die alt-niederländische Malerei* (Leipzig, 1906), Fierens-Gevaert, *Les primitifs flamands*, vol. II (Brussels, 1909).

HUGUENOTS, hū'gē-nōts, *Fr. pron.* ug'nō' (derivation unknown, possibly corrupted through *Ignots*, *Iguenots*, from Ger. *Eidgenossen*, confederates, according to others, a diminutive of *Hugo*, *Hugues*, Hugh, a patron saint of Tours). The name borne by the Protestants of France from about the year 1560 till their extinction as a political party in the seventeenth century; in a more general sense, the adherents of the Reformed religion before the French Revolution. Lutheran Protestantism invaded France probably between 1520 and 1523, and its principles were warmly embraced by large numbers of the learned classes and the nobility. The followers of the new religion enjoyed the special protection of Margaret of Angoulême, Queen of Navarre and sister of Francis I. The work of John Calvin (q.v.), himself a Frenchman, gave energy and cohesion to French Protestantism; but its strength always remained in the nobility and the middle classes, and it never appealed to the masses of the people, as in northern Germany.

Towards the end of his reign Francis I opposed the Huguenots with great severity and caused many to be burned. During the reign of Henry II the persecution assumed a still severer character, the *Chambre Ardente* (q.v.) being instituted in 1535 for the trial of heretics. Nevertheless the Protestants increased in numbers and strengthened their organization, although this year marks the beginning of their emigrations. John Calvin was the most famous émigré. The first national synod on May 23,

1559, adopted a Calvinistic code of 80 articles which became the constitution of French Protestantism. Fifteen churches were represented at that synod. Two years later there were over 2000. The influence of the Guise family, who began to come into power in the reign of Francis I, now showed itself in bitter warfare upon the Huguenots, whose cause was supported by the powerful Bourbon family, the great rivals of the Guises. In 1560 the extremists among the Huguenots, headed by La Renaudie, a nobleman of Périgord, conceived the plan of seizing the person of the young King, Francis II, and placing him under the guardianship of the Bourbon princes. The plot, however, known as the Conspiracy of Amboise, was betrayed; the King was made secure in the castle of Amboise, and the Duke of Guise was appointed Governor-General. The Edict of Romorantin, in May, 1560, took the prosecution of heretics out of the hands of the parlements and put it into those of the bishops. By the Assembly of Notables in August it was resolved that the whole matter of religion should rest until the next assembly of the States-General. Francis II died on Dec 5, 1560, and Charles IX, a boy of 10, ascended the throne. The Queen mother, Catharine de' Medici (qv), being determined to take the power into her own hands, was compelled to seek Huguenot support against the Guises. For the complete termination of strife the court caused a religious conference to be held at Poissy in September, 1561, between the representatives of the two religious parties. The chief disputants were the Cardinal of Lorraine on the one side and Theodore Beza (qv) on the other. The effect of the discussion was merely to widen the breach between the Catholics and the adherents of the new confession, but it served to unite and embolden the Huguenots, with whom the machinations of the Guises forced Catharine into closer alliance. On Jan 17, 1562, appeared an edict giving noblemen the right of the free exercise of their religion on their own estates. This was followed by the recourse to arms on the part of the Guise faction.

Violence and reprisals were perpetrated on both sides. On March 1, 1562, a company of Protestants, meeting in a barn at Vassy for religious exercises, was attacked, and many of them were massacred by the followers of the Duke of Guise. Condé raised the Protestant standard at Orléans, protesting allegiance to the crown, but demanding freedom of conscience. The Guises seized the person of the King and proclaimed the Huguenots rebels. This was the beginning of the First Civil War. The Huguenots were at first successful, overran the southwestern part of the country, and were joined by 4000 soldiers from Germany. At Dreux, however, Dec 19, 1562, the Protestants were defeated. The Duke of Guise was assassinated before Orléans, Feb 18, 1563, and on March 19 the Queen mother concluded the Peace of Amboise, which granted a large measure of religious freedom to the nobles, but set aside one town only in every bailiwick as a place of worship for the Huguenots. The terms of the treaty were disadvantageous when compared with the provisions of the Edict of January, 1562, and were accepted by Condé against the vehement remonstrances of Coligny (qv). Catharine hated the new faith, and with the help of the Holy League (see the fifth HOLY

LEAGUE) formed a close alliance with the Spaniards for the extirpation of heresy, retrenched the privileges of the Protestants, and made attempts upon the liberty and life of Condé and of Admiral Coligny. These leaders then determined to take possession of the King's person in September, 1567. The court took refuge in Paris, which Condé invested, on Nov 10, 1567, a battle was fought at Saint-Denis between Condé and a much superior force under the Constable Montmorency (qv), and soon after Condé fell back into Lorraine, where he effected a junction with an auxiliary force of 10,000 men from Germany and again threatened Paris, upon which Catharine determined to conclude peace, and the Second Civil War was terminated by the Treaty of Longjumeau on March 23, 1568, which confirmed the terms of the Treaty of Amboise. Catharine, however, had consented to the treaty only to gain time and had no intention of acting up to its terms. Plots were formed against the lives of Condé and Coligny, who fled to La Rochelle, where they were joined by Jeanne d'Albret, Queen of Navarre, and her young son Henry. With reinforcements from Germany and England the Huguenots began the Third Civil War, but at Jarnac, March 13, 1569, they were defeated by the royal troops under the nominal command of the Duke of Anjou, afterward Henry III, and Condé was slain after he had rendered himself prisoner. Jeanne d'Albret endeavored to recoup these reverses in an assembly at Cognac and set up her son, then but 15 years of age, as the head of the Protestant cause. Coligny became their military leader and, having received a further accession of troops from Germany, laid siege to Poitiers, but was again defeated by the Duke of Anjou at Moncontour, October 3. French reinforcements from England, Switzerland, and Germany enabled Coligny to take Nîmes in 1569 and to relieve La Rochelle, while La Noue obtained a victory over the royal troops at Lugon. Catharine and her son now sought for peace, to which the Protestants, weary of the hard contest, consented. The treaty, concluded at Saint-Germain-en-Laye on Aug 8, 1570, gave to the Protestants the free exercise of their religion everywhere except in Paris, and the possession of a number of strongholds.

Catharine, having failed to overthrow the Protestant cause in the open field, sought to accomplish her object by treachery. She entered into friendly relations with the Huguenots, partly, it is true, out of fear of the Guise family. After September, 1571, Admiral Coligny exercised great influence at court and was received with much show of affection by the young King and the Queen mother. The marriage of Henry of Navarre, who had just succeeded his mother in his little kingdom, to Margaret of Valois, sister of Charles IX, seemed to promise an end to the period of civil strife. Then came the Massacre of St. Bartholomew's Day, Aug 24, 1572 (see BARTHOLOMEW, MASSACRE OF SAINT), when thousands of Huguenots, among them Coligny, perished. So far from effecting its intended purpose, this detestable deed only roused the Huguenots to take up arms again. They were forced to form a political party or else be completely subjugated. The Duke of Anjou lost his army before La Rochelle, and on June 24, 1573, concluded a peace at that place by which the Protestants obtained complete freedom in

the exercise of their religion in the three towns of Montauban, Nîmes, and La Rochelle, which were exempted also from the obligation of receiving a royal garrison. Everywhere else the Huguenots were promised freedom from molestation on condition that they should not hold assemblies of more than three persons at a time. A section of the Roman Catholic nobility, at whose head was the Duke of Alençon, the youngest son of Catharine, from purely political motives, united with the Huguenots, and their cause was strengthened by the support of the Politiques (qv), the party which put "France" before religion. The accession of Henry III, in 1574, was followed by the outbreak of the Fifth Civil War. Henry of Navarre, who since St. Bartholomew's Day had remained a virtual prisoner at the French court, succeeded in making his escape in February, 1576, and, placing himself at the head of the Huguenot forces in the south, achieved a number of successes in Guenne. This led to the conclusion of the Treaty of Beaulieu, called the Peace of Monsieur, May 6, 1576, by which the Huguenots were granted an increased number of places of security and partial representation in the Provincial parlements. This was regarded by the Catholics as a surrender to heretics and traitors who had not hesitated to call in foreign aid against their sovereign. The Duke of Alençon was won back to the support of the court, and under the auspices of Henry, Duke of Guise, the Catholic League was organized for the defense of the Church, the extirpation of heresy, and the maintenance of the honor and authority of the King. Although there were certain ulterior motives which made the League dangerous to the house of Valois, Henry III for the time put himself at the head of the movement and at the close of 1576 assembled the States-General at Blois. The severe measures enacted by this body against the Huguenots kindled the Sixth Civil War (1577), which was marked by no important engagement. Peace was concluded at Bergerac on Sept. 17, 1577, and confirmed by the Edict of Poitiers, which guaranteed the preservation of the *status quo*. The Seventh Civil War (the *Guerre des Amoureux*) broke out in November, 1579, with little cause and was terminated by the Peace of Fleix in November, 1580, with little result.

There was now a comparatively long interval of repose till 1584, when, by the death of the Duke of Anjou (formerly Alençon), Henry of Navarre became heir to the throne of France. Hereupon Henry, Duke of Guise, exerted himself for the revival of the League entered into an alliance with Spain and the Pope for the extirpation of heresy, declared the Cardinal of Bourbon heir to the throne, and began hostilities against the Huguenots. The results of 25 years of warfare were destroyed by the Edict of Nemours (July 7, 1585), which annulled all previous edicts of toleration. This was followed by the outbreak of the Eighth Civil War, known as the War of the Three Henrys (Henry III of France, Henry of Navarre, Henry of Guise). The Catholic League and the King put no less than seven armies into the field, while the Huguenots received large reinforcements from Germany. At Coutras, Oct. 20, 1587, Henry of Navarre defeated the Catholic army, but this was offset by the victory of Guise over the German auxiliaries at Montargis. So contemptible had Henry III become in the eyes of

the people of Paris that the entrance of the victorious Duke of Guise into the city on May 9, 1588, was followed by an insurrection in his favor. While the Duke was negotiating with the Queen mother, Henry III fled from Paris, but at Rouen in July, 1588, acceded to all the demands made by Guise, the extermination of heresy in the kingdom, the convocation of the States-General, and the appointment of Guise to the post of lieutenant general of France. At Blois, on Dec. 23, 1588, Henry III caused the Duke of Guise to be murdered and summoned to his aid Henry of Navarre. In less than a year the King himself was assassinated by Jacques Clément, and Henry of Navarre succeeded to the throne. The League, however, now under the leadership of the Duke of Mayenne, the brother of Henry of Guise set up the Cardinal of Bourbon as a rival King and, with the aid of Spanish troops, held its own in Paris. Outside, however, it suffered two crushing defeats at Arques and Ivry. On July 25, 1593, Henry of Navarre formally embraced Catholicism and in the following year gained possession of the capital. The civil wars in France were brought to an end by the Peace of Vervins between Henry and the Spanish King, May 2, 1598. On April 13 of the same year the King, in the Edict of Nantes (see NANTES, EDICT OF), guaranteed the Huguenots full liberty of conscience and the preservation of their religious and civil condition. See HENRY IV.

Though Henry IV, convinced that the French were a Catholic people and would never accept a Protestant sovereign, abjured his faith on political grounds, his reign was one of broad toleration, and his great Minister, Sully, was a Huguenot. But when, during the minority of Louis XIII, Maria de' Medici, the Queen of Henry IV, assumed the reins of government, the many privileges enjoyed by the Huguenots were found to have created a strong party that stood in the way of absolutism. The King took an oath in 1614 to maintain the Edict of Nantes, but the marriage treaties with the Spanish court excited the apprehensions of the Huguenots to such a degree that, in November, 1615, they made common cause with the Prince of Conde, who had set up the standard of rebellion. This was contrary to the advice of the most sagacious of their own party. Although by the Treaty of Loudun, May 4, 1616, they obtained a new confirmation of their freedom of worship, the court now only waited for an opportunity of breaking at least their political power. In June, 1617, a royal edict commanded the entire suppression at once of the Protestant church and of political privileges in the Province of Bearn, but the Provincial court at Pau refused to register the edict, and the matter lay over until 1620, when, urged by his adviser that the time was opportune to strike decisively, the King carried the edict into full effect by force of arms. The Protestants throughout all France took alarm, and hostilities again broke out in May, 1621. At the head of the Protestants were the two brothers the Duke of Rohan and the Prince of Soubise. Their cause, however, was feebly maintained, almost all the Protestant towns fell into the hands of the King, force, stratagem, and bribery being equally employed. By the Treaty of Montpellier, Oct. 19, 1622, the Huguenots lost a number of their strongholds and the right of assembly without permission of the King. The court, however,

paid little attention to the stipulations of the treaty, and when the government was involved in difficulties in Italy, the Protestants took the opportunity again to rise in arms (1625). Soubise, with a fleet furnished by the town of La Rochelle, more than once defeated the weak royal navy. Cardinal Richelieu, who had assumed control of the affairs of state in 1624, was a believer in absolutism. He sought to overthrow the Huguenots as a political force and pursued this end relentlessly. He took charge himself of the siege of La Rochelle, the Huguenot stronghold, which was taken after an heroic resistance, Oct. 28, 1628. The fall of La Rochelle was speedily followed by that of Nîmes, Montauban, and all the other Protestant strongholds. The Peace of Alais, June 27, 1629, put an end once for all to the civil wars in France and to the Huguenots as a political party. Richelieu was a great statesman and politician, and when the political power of the Huguenots was broken, he endeavored by conciliation to attach to the state these people, of whom some were the best and most useful in France. This policy was not changed under Mazarin, and Colbert during his years of power restrained Louis XIV from persecution. After Colbert's death the King entered upon a rigorous policy of repression under the influence of religious conviction. Political motives, however, may have served to determine the policy of Louis XIV for the presence of a powerful element in the country differing in belief and to some extent in political theory from the generally accepted doctrines must have clashed with the Grand Monarch's ideal of a nation dwelling in peaceful uniformity under the wing of a benevolent autocracy. The Huguenots were deprived of civil rights, and in the southern provinces, where Protestantism was strong, recourse was had to severer measures. To force them into the bosom of the Church, the people were handed over to the mercies of a licentious soldiery. Detachments of troops were quartered on the inhabitants, while bodies of cavalry patrolled the country, demolishing the places of worship and in some cases putting the Huguenot preachers to death. (See DRAGONNADES.) Hundreds of thousands of Protestants fled to Switzerland, the Netherlands, England, Germany, and the West Indies, as well as to South Carolina, New York, Massachusetts, and other North American colonies. The climax of this persecution was the revocation, Oct. 18, 1685, of the Edict of Nantes, which deprived the Huguenots of their last defense and gave a new impulse to the emigration which took the best blood of France to strengthen her rivals. Thousands betook themselves to the mountains of the Cévennes and continued the exercise of their religion in secret. Among these and the mountaineers of the Cévennes a remarkable fanatical enthusiasm displayed itself, and under the name of Camisards (qv) they maintained for a number of years a wonderfully successful opposition to the forces of the great monarchy. The War of the Cévennes, or Camisard War, began in 1702 and was not terminated until 1705, sporadic outbursts continuing until 1709 or 1710. The suppression of the local rebellion was attended with circumstances of great cruelty. France, after the revocation of the edict, lost more than 400,000 of her population, among them many of wealth and position, besides a number of the middle classes engaged

in mechanical pursuits. The total emigration is variously estimated from 400,000 to 1,000,000 while, notwithstanding the many persecutions, about 1,000,000 Protestants remained.

The partial repose which the Protestants enjoyed for more than 10 years was attended by a revival of their worship, especially in Provence and Dauphine. In 1724, therefore, Louis XV, influenced by political motives, issued a severe edict against them. The spirit of the age, however, now began to be opposed to persecution. An edict in 1752 declared marriages and baptisms by Huguenot ministers to be null and required the repetition of them by the Roman Catholic clergy. But when, upon this, many began again to flee from their country, the disgust of the Roman Catholics themselves was so much excited that the court recalled the edict (1787). Montesquieu and Voltaire successfully advocated the cause of toleration.

French Protestantism in the Nineteenth Century. The first movement towards toleration of Protestantism after the revocation of the Edict of Nantes was the edict of Louis XVI, in 1787, legalizing Protestant marriages. By the concordat concluded between Napoleon and Pope Pius VII, in 1801, Protestantism (Calvinist and Lutheran) and Judaism became, with Catholicism, established religions, with equal protection and a proportional measure of state support, but subject at the same time to the strictest governmental control. By the concordat religion became a part of government, and religious liberty was lost. No church was permitted to make converts from any other, though this law soon became a dead letter with regard to the Roman Catholic church. The Protestant General Synod was put down, particular synods could be convened only by government. Undue ecclesiastical power was given to consistories (elected presbyterial committees), tending to the disintegration of the Church and opening the way for later divisions. The parishes were few in number, most of them very extensive, and more than half of them (100 out of 171) without pastors. Under these circumstances religion became a mere form, or simply the expression of a political idea. There were no schools, religious literature, or asylums of any description. The confirmation of the young, irrespective of religious experience, was a measure of self-preservation. Brilliant exponents of Protestantism at this time were Madame de Stael and Benjamin Constant.

A revival of French Protestantism from its depleted condition after the Revolutionary period and the subsequent political turmoil, during which it suffered greatly, took place under the Scottish Haldanes (see HALDANE, JAMES ALEXANDER, and ROBERT) and the English Methodist Cook (see COOK, CHARLES) in the early twenties. To the revival the formation of the Bible Society in 1819 and the Missionary Society in 1822 contributed. During this period Samuel Vincent introduced German Protestant theology into France and created a liberal movement against the narrow orthodoxy of the revival. Aggressive propaganda being forbidden by law, there was much suffering for conscience' sake. In 1826 the Catholic Prince de Salm was exiled for having embraced Protestantism. Debarred thus from normal activity, the awakened Church turned to benevolent work, and the second third of the century saw the rise of a great number of strong

benevolent and religious societies. The Evangelical Society was founded in 1833, the Central Society in 1847, for the building of churches. Orphanages, refuges for the blind, the deaf, for neglected, criminal, and crippled children, sprang up in great profusion. Educational interests took a prominent place. In 1829 the Society for the Encouragement of Primary Instruction among Protestants was founded. In 1833 the Protestant Guizot secured the passage of the common-school law. In 1840 there were 677 Protestant schools, from primary to normal. There are two theological faculties—at Montauban and in Paris.

From this period dates also the foreign-mission work of the Protestant church, a history of almost unparalleled zeal and self-sacrifice. The Society of Evangelical Missions was founded in 1822, the first missionaries went to South Africa in 1829. The mission fields are now seven in number—in Africa, the Society Islands, and Madagascar.

Protestant journalism also dates from the revival. *Le Semeur*, founded in 1831, enjoyed the collaboration of Vinet. *Le Lien* was founded in 1840 by the elder Athanase Coquerel (qv), to counteract the growing tendency to disintegration—a vain effort, as it proved. The narrow if profound evangelicalism of the revival produced a reaction, fostered by the liberal teachings of the theological school at Strassburg, which ended in the schism of 1848 between the orthodox and liberal wings of the Reformed church, still held together by the Concordat of 1802. The question of the relations between church and state became a capital one, Vinet wrote a book advocating separation and would have headed such a movement but for the powerful opposition of Guizot. The learned of that day strongly advocated it, in 1847 Lamartine declared that separation would not be too dearly purchased by a revolution. The next year (1848) the Count de Gasparin (see GASPARI, AGÉNOR ETIENNE) and Frederic Monod headed the Free church movement. In 1840 the Union of Free Evangelical Churches of France was formed, based quite as much upon individual religious experience, in opposition to the formalism of the Reformed church, as upon the separation of church and state. This movement, never numerically important, barely reaching the number of 50 churches in all France, has yet been notable for the ability of its leaders—Pressensé, Bersier, Hollard, the Monods—and for its support to the orthodox as against the liberal wing of the Reformed church.

The year 1852 saw a new impulse in the Church. The Sunday-School Union and the French Protestant Historical Society date from this year. In 1850 the celebration of the tercentenary of the first synod of the Reformed churches showed the deep attachment of the people to the traditions of the past.

During all this time the liberal ferment was working in the Church, a spirit not so much of *unorthodoxy* as of *freedom*. The attempt of the elder Coquerel to draw the two wings together proved sadly abortive when, in 1864, after a conflict of several years, the younger Athanase Coquerel was tried for heresy, under the leadership of Guizot, for having hailed Renan's *Life of Jesus* as a sign of revived interest in religious studies, while combating his views as to the person of Christ. Coquerel defended himself nobly, but was condemned, by 12 voices

to 3, in the Consistory of Paris, and in spite of the protest of 8000 church members of that city he was deposed from the ministry, the state not interfering, as he was suffragan, not titular, pastor. He continued to preach, however, being supported by the Protestant Liberal Union (founded in 1860). Guizot's victory in this case nearly cost him his seat in the consistory. At the next election he was returned only by a majority of 8 in a vote of 2600.

In the Franco-Prussian War many Protestant pastors rendered distinguished service. At its close the Reformed church took up the question of reorganization, the Lutheran that of the inroads caused by the loss of Alsace, which robbed it of 38 consistories and 191 parishes, while the Reformed churches had lost 5 consistories and 26 parishes.

The twenty-ninth General Synod of the Reformed churches had been held in 1659. Six synods held in "the Desert" during the century of persecution had not been of national extent. The thirtieth synod was convoked by President Thiers in 1872, at the instance of Guizot. The synod memorialized President Thiers in favor of disestablishment, but in vain. A strong but vain effort was made to bring together the two wings of the Church. Since that time, no official synod of the whole Church being possible, the orthodox wing has met triennially in "official" synod, the liberal wing in fraternal assembly, both bodies electing representatives to the Permanent Committee, which alone is recognized by government.

Of late years, in view of the anti-Protestant movement of the ultramontane party in the Catholic church and of the rapid spread of atheistic Socialism, both wings of the Church have recognized the importance of union and have earnestly sought a common doctrinal basis. Failing in this effort, in 1890 delegates from both bodies met in Lyons and formed a practical union for work in the League for the Moral and Social Improvement of the Country. This League was immediately joined by the Free and Lutheran churches, and by the Methodist and Baptist missionary churches. At the officious synod at Anduze, in May, 1902, the serious effort to find a basis of doctrinal agreement again failed, but was prophetic of union in the near future. At this synod the unanimous adoption of a resolution asking for disestablishment placed the Reformed church in line with the advocates of Church disestablishment in France. In December, 1905, a law was passed which separated church and state. The Protestants look upon this as a great victory for their energetic movements for reform.

The establishment of the Third Republic had been the signal for a forward evangelistic movement, to which the founding of the Mission Populaire Evangélique in 1871 by the Rev Robert McAll, of England, contributed much (See McALL MISSION.) The Law of 1878, giving full religious liberty, opened the door to an active home-mission work, already initiated in 1872 by the Interior Mission. Social questions have largely occupied the attention of Protestants. E. de Pressensé, pastor, historian, senator, led the movement for the purification of the press, a movement which in 1902 took on new life under the energetic action of Pastor Wilfred Monod, of Rouen. Charles Robert introduced and advocated profit sharing. Jules Siegfried headed the movement for im-

proved workingmen's dwellings; Gide and Boyer that for business coöperation; Léon Say that for Sunday rest; Richard Waddington that for labor unions. Dr. Legrain has been prominent in the temperance movement; Pastor Robin in that for prison reform and "assistance by work"; Pastor Arbourg in that for benefit associations; Pastor Fallot in that for public morality. Protestant pastors have a league for the study of social questions. A large proportion of the younger pastors, led by Elie Founelle, of Roubaix, and Wilfred Monod, with many of the younger laymen, are actively promoting the movement for social Christianity, which seems better adapted than any other movement to make a stand against the rapidly growing antireligious Socialism. Among the activities of these Social Christians is the founding of "solidarities"—social settlements distinguished not only by their evangelistic character, but by the prominence given to "mutuality," to works of economic betterment, and "get-together" methods of bringing class into normal relations with class.

The career of French Protestantism has been very closely interwoven with the modern political development of the country. Though a small minority, it has always been aggressive and resolute in maintaining its position. Many distinguished men have appeared in its ranks throughout its history. In education, law, finance, and reform it has taken a prominent part. In the founding of savings banks, the abolition of the slave trade, the revival of various industries, French Protestants have ever been foremost, and to-day are a very influential element throughout France.

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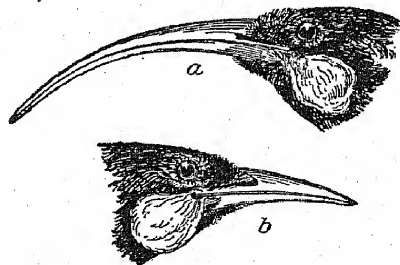
HUGUENOTS, u'g'-nô', LES. An opera in five acts by Meyerbeer, with words by Scribe, first produced in Paris in 1836. It is the first of the historical, as distinguished from the purely romantic operas. The plot deals with the persecutions of the French Huguenots in the seventeenth century.

HUGUENOT SOCIETY OF AMERICA, THE. An hereditary patriotic society, organized in New York City on April 12, 1883, and incorporated on June 12, 1885. Its objects are to perpetuate the memory and to foster and promote the principles and virtues of the Hugue-

nots; to commemorate publicly at stated times the principal events in the history of the Huguenots; and to collect and preserve all existing documents, monuments, etc., relating to the genealogy or history of the Huguenots of America. Membership is extended to descendants of Huguenot families which emigrated to America or to other countries prior to the promulgation of the Edict of Toleration, Nov. 28, 1787, as well as to writers who have made the history of the Huguenots a special subject of study. The insignia of the society consist of a badge, pendent from a gold dove with spreading wings surmounted by a rising sun, and worn on a watered-silk ribbon of white, bordered with red, white, and blue. The badge itself is of gold, surrounded by a wavy, ornamental border, and bearing on the obverse the device of Marguerite de Valois, a marigold turning towards the sun, and a ribbon with the motto "Non Inferiora Secutus," while on the reverse is the name of the society as well as the name of the member and number of the badge. This society has its headquarters in New York City, where a valuable library, consisting of Huguenot books, manuscripts, etc., has been collected. There are branch societies in several States and cities, notably in Virginia, Pennsylvania, South Carolina, and New Jersey. Its publications are known as *Collections of the Huguenot Society of America*. In 1898 it celebrated the tercentenary anniversary of the promulgation of the Edict of Nantes, at which delegates from societies abroad were present. A memorial volume containing a full account of the exercises was published in 1900.

HUGUES CAPET. See HUGH CAPET.

HUIA, hoo'ya (Maori name). A remarkable bird of New Zealand (*Heteraloea acutirostris*), now considered one of the starling family and approaching extinction, because it is



HEADS OF HUIA.

a, female; b, male.

confined to the limited forests of certain mountain ranges and is constantly pursued as a cage bird or as a curiosity and also by the natives, who regard its tail feathers as the emblem of rank. It is about the size of an American thrush, and both sexes are glossy green black, excepting a white terminal band upon the tail and the large rounded wattles at the gape, which are orange red. Their ivory-white bills, however, differ to a degree unknown elsewhere among birds. That of the female is long, slender, curved, and hoopoe-like; that of the male only half as long and much straighter and shorter. Sir William Buller has described the species very fully (*Birds of New Zealand*, 2d ed., London, 1888). He says its favorite food is the grub of a large, timber-boring beetle. The male

bird, with his short stout bill, attacks the more decayed portions of the wood and chisels out his prey, while the female, with her long slender bill, probes the holes in the sounder part, the hardness of which resists the male's weapon, and elsewhere she obtains for him grubs beyond his reach. The pairs are devoted companions, and when one has been captured the other is easily taken. These birds nest in hollow trees. The huia is protected by Act of Parliament, and strong efforts are being made to save it from extinction.

HUICHOL, wé-chôl' (a corruption of the native name, signifying prophet, doctor). A wild tribe of the remote Nahuatl stock, occupying six villages in the rough mountain region of northwestern Jalisco, Mexico. Despite former missionary efforts and long-continued contact with Spanish civilization, they are said to be living in the same state of barbarism as when Cortes first put foot on the Mexican soil. Their culture is that of the well-known Pueblo type, displaying a number of ceremonial rites, especially in connection with the Peyote (qv), which they call Hikuli. They number 4000. Consult Lumboltz, *Unknown Mexico* (New York, 1902).

HUILA, wé'la. A department of Colombia, having an area of 8100 square miles. It lies between the central and eastern Cordilleras, which form its boundaries. The Magdalena River has its headwaters in the highlands of the south of the department and flows northward through its centre. The department is one of the most backward in the country, having no means of communication except a few trails and the Magdalena, which is navigable only at certain seasons. The chief industries are stock raising and agriculture. The principal products are cacao, rice, coffee, sugar cane, tobacco, and corn. Gold mining is carried on to some extent, and there are manufactures of Panama hats, cigarettes, and cotton and woolen goods. In the southern part near the village of San Agustín are found important ruins of an ancient civilization. Pop., 1912, 158,191. Capital, Neiva (qv).

HUI-SHEN, hwé'shén'. A Buddhist monk and traveler of the fifth century. See HWEI-SANG.

HUISMAN, hois'man, ROELOF. See AGRICOLA, RODOLPHUS.

HUITFELDT, hwét'fêlt, ARILD (1546-1609). A Danish historian and statesman. After studying in Germany and France he entered the diplomatic service and finally became Chancellor of the kingdom. He published a long series of volumes on the history of the Kings of Denmark to the death of Christian III. These were afterward issued under the title *Denmarks Riges Krønike* (1650-52). The work is uncritical in its judgments, but preserves many valuable documents.

HUKAU. See HOKOW.

HULAKU KHAN, hū-lā'kū kan. See MONGOL DYNASTIES.

HUL'DA, or HOLDA. In the mythology of northern and central Germany, especially of Franconia, Hessen, and Thuringia, a spiritual being, usually benign, corresponding to the Berchta of southern Germany and Switzerland and the Frigga of Scandinavian mythology. She is supposed to frequent springs and lakes. To her the souls of dying children betake themselves. She flies through the air with her attendants, bringing fortune to the good and misfortune to the evil. She sometimes has witches

among her followers. See BERCHTA, FREYJA AND FRIGGA.

HULEH, hū'lē. See MEROM, WATERS OF.

HULL. A city, the capital of Wright Co., Quebec, Canada, on the Ottawa River, opposite the Rideau Canal and the city of Ottawa, with which it is connected by two suspension bridges, and on the Canadian Pacific Railroad (Map Quebec, C 5). The city is the seat of a Roman Catholic college and possesses a fine park. It is a manufacturing city; its products include pulp, paper, matches, sulphur and sulphite, wooden ware, Portland cement, pork packing, lumber, axes, hi-cuts, tents, awnings, and electric supplies. The value of its manufactured products in 1910 was \$7,250,301, as compared with \$3,182,050 in 1900. The city was almost totally destroyed by fire in 1900, 3000 buildings in all being burned. It has been rebuilt. Pop., 1901, 13,933. 1911, 18,222.

HULL, officially KINGSTON-UPON-HULL. A seaport city and a parliamentary and county borough in the East Riding of Yorkshire, England, at the confluence of the Hull with the estuary of the Humber, about 20 miles from the North Sea and 41½ miles by rail east-southeast of York (Map England, F 3). The town stands on a level plain amid uninteresting surroundings. The modern portion has spacious, regular, and well-paved streets, while the old quarter, which serves as the business section, has narrow, crooked lanes and is very crowded, forming an irregular peninsula. Among noteworthy public buildings are Holy Trinity Church, founded 1412, a Decorated and Perpendicular building, one of the finest parish churches in England; the town hall, the new exchange, corn exchange, and market hall. There are statues of William III, erected 1734, and of Bishop Wilberforce, who was born at Hull. The chief educational establishments are the grammar school, founded in 1486, the Trinity House nautical school, 1716, Cogan's charity school for girls, 1763, the Hull and East Riding College, Hymers' College, the Royal Institution, the literary and philosophical institute, mechanics' institute, technical school, and school of art. There are numerous charitable endowments. The city owns the markets, tramways, electric lighting, and a profitable water supply from springs, and maintains parks, free libraries, public baths and washhouses, a fire brigade, a crematorium, a sanitarium, cemeteries, a refuse destructor, and a disinfectory.

Hull has an extensive coasting, fishing, and foreign trade. It has regular communication with Germany, Russia, Holland, Belgium, Scandinavia, Denmark, the United States, India, and Australia, and is the seat of a United States consul. It exports the woolen and cotton goods of the midland counties, coal, oil, machinery, and mill work, and imports cattle, grain, timber, wool, flax, hemp, tallow, pitch, etc. It has capacious docks covering about 200 acres. Since 1888 the ports of Hull and Goole have been administratively combined.

The net tonnage (excluding coasting vessels) entered in 1912 was 3,964,583, and cleared, 3,496,169. Hull is thus, in respect of tonnage, the sixth port in the United Kingdom, being exceeded by London, Liverpool, Cardiff, Newcastle, and Southampton. Imports at Hull in 1905 were valued at £32,545,886, and exports at £21,002,686; in 1912, £48,607,902 and £31,738,505, in the value of its foreign and colonial

trade it is exceeded only by London and Liverpool. Oil mills, shipbuilding yards, engineering works, iron foundries, rope and sail making, tanneries, breweries, chemical and color works, and the many industries of a large seaport, afford employment to thousands of workmen.

The city is governed by a mayor, 16 aldermen, 48 councilmen, a recorder, and a sheriff. As a parliamentary borough, it sends three members to Parliament. Consisting of Myton and Wyke, two villages, as Myton-Wyke it developed into an important port shortly after the Conquest. Struck with its advantages as a port, Edward I purchased it in 1298, renamed it Kingston-upon-Hull, and gave it the charter of a free borough. Its fisheries and trade prospered under the enterprise of its merchant princes, the De la Poles, and in 1339 it supplied Edward III with 16 ships and 466 seamen for his armament against France. In 1588 it furnished Elizabeth with £600 and 800 men against the Spanish Armada. During the Civil Wars Hull was garrisoned by the Parliamentarians, and the Governor, refusing to admit King Charles, precipitated hostilities, it successfully resisted two long sieges by the Royalists. In 1534 it was made the seat of a suffragan bishop and again in 1891. After the fifteenth century its commercial importance increased with its imports of fish from Iceland. It was one of the first ports to engage in, and until late in the nineteenth century was the headquarters of, the whale fishery. Pop., 1801, 29,500, 1851, 84,700, 1891, 200,473, 1901, 240,259; 1911, 278,024, in population the city is thus the fourteenth in the United Kingdom. Area, 904.2 acres. Consult Symons, *Hulliana, or Selections from Local History* (Hull, 1872), and Freeman, *English Towns* (London, 1883).

HULL, CHARLES HENRY (1864-). An American educator, born at Ithaca, N. Y. He graduated at Cornell University in 1886, until 1890 was in the Cornell Library, and studied at the universities of Göttingen, Halle, and Berlin. He returned to Cornell to be assistant professor of political economy (1893-1901), professor of American history (after 1901), and dean of the College of Arts and Sciences (1908-13). He edited *The Economic Writings of Sir William Petty*, which was brought out by the Cambridge University Press, England.

HULL, CORDELL (1871-). An American legislator, born in Overton (now Pickett) Co., Tenn. He studied at the National Normal University at Lebanon, Ohio, in 1889-90, and he graduated from the Lebanon (Tenn.) Law School in 1891. He was admitted to the bar in 1891, was a member of the Tennessee House of Representatives in 1893-97, served as captain in the Fourth Tennessee Infantry during the Spanish-American War, and was judge of the Fifth Judicial Circuit of Tennessee in 1903-07. After 1907 he was Representative in Congress of the Fourth Tennessee District. A Democrat in politics, Hull was especially active in the legislation making effective the income tax.

HULL, EDWARD (1829-). A British geologist and physiographer, born in Antrim, Ireland, and educated at Trinity College, Dublin. He was appointed to the Geological Survey of the United Kingdom in 1850 and in 1869 became professor of geology in the Royal College of Science. In 1883-84 he led a scientific expedition to Palestine for the Palestine Exploration Fund, gathering material which he used

in his *Mount Seir, Sinai, and Western Palestine* (1905) and in *Physical Geology of Arabia Petrea and Palestine* (1886). Among his published works are *Building and Ornamental Stones* (1872), *The Coal Fields of Great Britain* (5th ed., 1903), *Physiology* (1888), *Physical Geology and Geography of Ireland* (2d ed., 1891), *Volcanoes, Past and Present* (1892), *Our Coal Resources* (1897), *Sub-Oceanic Physiography of the North Atlantic Ocean* (1912). Consult his *Reminiscences of a Strenuous Life* (London, 1910).

HULL, ISAAC (1775-1843). An American naval officer. He was born at Derby, Conn., became a cabin boy on a merchant vessel at the age of 14, soon showed great aptitude for the handling of a ship, and before he was 21 was placed in command of a merchantman. In 1798 he entered the United States navy as lieutenant, serving for several years on the *Constitution* and becoming first lieutenant in 1801, and, after distinguishing himself against the French at Port Plate, Haiti, participated, as commander of the *Argus*, in the war with Tripoli. He became captain in 1806 and at the opening of the War of 1812 was in command of the *Constitution*. While on his way from Annapolis to New York in July, 1812, he escaped by masterly seamanship from a British squadron of five strong men-of-war, which pursued him for three days. On August 19 he fought his celebrated engagement with the *Guerriere*, a slightly weaker British frigate, which after a brief conflict was forced to surrender. (See CONSTITUTION, THE.) The victory was the first obtained by the Americans over the British in this war and aroused the greatest enthusiasm throughout the United States. Subsequently he was a member of the Naval Board, was at the head of the Boston and New York navy yards, and, as commodore, was in command for a time of squadrons in the Pacific and the Mediterranean. He is regarded by naval critics as the ablest single-ship commander on either side during the War of 1812. Consult Barnes, *Naval Actions of the War of 1812* (New York, 1896). For a spirited account of the fight between the *Constitution* and the *Guerriere*, consult C. F. Adams, *American Historical Review* (ib., 1913).

HULL, WILLIAM (1753-1825). An American soldier. He was born in Derby, Conn., graduated at Yale in 1772, studied law at Litchfield, Conn., and was admitted to the bar in 1775. In July, 1775, soon after the outbreak of the Revolutionary War, he entered the American army as a captain and served thereafter until the close of the war, taking part in the battles of Trenton, Princeton, Saratoga, and Monmouth, leading a column in the assault on Stony Point, and rising (August, 1779) to the rank of lieutenant colonel. After the war he removed to Newton, Mass., became major general of Massachusetts militia, and was elected to the State Senate. In 1805 he was appointed by President Jefferson to the governorship of the Territory of Michigan, which position he held until 1812, when he was raised to the rank of brigadier general and placed in command of the Northwestern Army. He joined his troops at Dayton on May 25 and led them through the wilderness to Detroit, where he arrived on July 5, having heard three days before of the declaration of war against England. On the 12th he took the offensive and crossed over to Sandwich, Canada, but wasted time in issuing futile proclamations

and, soon becoming alarmed, recrossed to Detroit. On Aug. 16, 1812, intimidated by the aggressive movements of the British General Brock, he surrendered without making any real attempt at resistance. A general outcry was raised against Hull, and finally, on March 26, 1814, a court-martial, assembled at Albany, N. Y., sentenced him to be shot. This sentence was approved by President Madison, who, however, remitted the punishment. There has since been much controversy over Hull's case, but it is now pretty generally agreed by historians that, though he surrendered with unsoldierly alacrity and might possibly have preserved Detroit and his army altogether, the blame for his surrender must rest fully as much with the administration as with himself. Consult Hull, *Defense of Brigadier-General Hull, with an Address to the People of the United States* (Boston, 1814), Forbes, *Report of the Trial of Brigadier-General Hull* (New York, 1814), Maria Campbell, *Revolutionary Services and Civil Life of Gen. William Hull, together with the History of the Campaign of 1812*, by James Freeman Clarke (ib., 1848).

HULLAH, JOHN PYKE (1812-84). An English musical composer, teacher, conductor, and lecturer. He studied the organ and piano under W. Horsley, and singing under Crivelli at the Royal Academy of Music. He was one of the most important factors in modern English musical life and accomplished more for the cause of music among the masses than any other English musician of the century. In 1840, while pursuing his studies in Paris, he was much impressed with the French system of tuition and upon his return to London in 1841 prevailed upon the National Education Committee to permit him to use a modification of it in his singing school for schoolmasters, which he inaugurated at Exeter Hall. His ideas and reforms met with determined opposition from the very beginning, but notwithstanding it is recorded that in the 20 years from 1840 to 1860 over 25,000 people availed themselves of the advantage of his classes. In 1847 his pupils and friends built and presented to him a building known as St. Martin's Hall, in which his pupils could give their public performances. He held appointments as professor of singing at King's, Queen's, and Bedford colleges, London, and succeeded Horsley, in 1858, as organist of Charter House. From 1870 to 1873 he led the Royal Academy concerts and for several years conducted the annual concert of the metropolitan school children, held at the Crystal Palace. In 1872 he was appointed government inspector of training schools. Besides three operas, which have but a local significance, he was the composer of many successful and widely known part songs, motets, anthems, and songs. His published writings cover every phase of musical art and aesthetics and include *A Grammar of Vocal Music* (1843), *A Grammar of Musical Harmony* (1852), *A Grammar of Counterpoint* (1864), *The History of Modern Music* (1862), *The Third or Transition Period of Musical History* (1865), *The Cultivation of the Speaking Voice* (1870), *Music in the House* (1877). He received the degree of LL.D. from Edinburgh University, was elected member of the Cecilia Society of Rome and member of the Academy of Music in Florence. He died in London.

HULL HOUSE. One of the most famous of

American social settlements, situated on South Halstead Street, Chicago. It takes its name from its original building, erected in 1852 by Charles J. Hull. In 1889 Miss Jane Addams (qv) and Miss Ellen Starr secured a lease of a part of the building, with the purpose of founding a social settlement after the pattern of Toynbee Hall (qv). Shortly afterward the owner of the building, Miss Helen Culver, gave a free leasehold on the entire building, which was remodeled and opened as a social settlement late in 1889. The earliest activities of Hull House were purely social. Readings were given before groups of young women from the neighborhood, an early volunteer conducted a kindergarten, the aged residents of the neighborhood were gathered together for New Year's festivities. Gradually the activities of the settlement were extended to the economic life of the district. Attempts were made to introduce cooperative buying and to give instruction in the economical use of foods, etc. After the Pullman strike, when class lines were sharply drawn in Chicago, Hull House came to be identified with the labor movement. Active discussion of economic questions was carried on at Hull House by a "working people's social science club," organized in 1890. In the movement for factory laws and regulation of the labor of children and women Hull House played a conspicuous part. One of its early residents, Mrs. Florence Kelley (qv), conducted an investigation of the sweating system for the State Bureau of Labor—an investigation that was in large measure responsible for the enactment of the first factory law of Illinois. The trade-unions of the women shirt makers and the women cloak makers were organized at Hull House and for a time held their meetings in its parlors. Residents of Hull House investigated the padrone system and conducted an active campaign for the creation of State employment bureaus. Thoroughgoing investigations by Hull House of the sanitary conditions in the immediate vicinity led to improvements in the enforcement of the laws and eventually to active participation by Hull House in the struggle for the purification of city politics. The settlement has taken active part in the movement for the more humane treatment of the juvenile delinquent, for the suppression of the truancy evil, and, in fact, in all movements for civic and social reform. No other agency has been more successful in meeting sympathetically the problems of the shifting body of immigrants making up the population of the ward in which the settlement is situated.

The organization of Hull House is extremely simple. The residents are volunteers, each free to pursue such work as may seem to him most fruitful. Throughout its history, however, the institution has been dominated by the personality of Miss Addams, and its work in its broad outlines has taken its direction from her. Investigation of actual conditions, when possible in conjunction with other similar organizations or with the public authorities, is a characteristic feature of the work. The ultimate object of much of this work is the arousing of the public to the necessity of State action in behalf of the city population. Consult Jane Addams, *Twenty Years at Hull House* (New York, 1910). See **SOCIAL SETTLEMENTS**.

HULLIN, u'lan', PIERRE AUGUSTIN, COUNT (1758-1841). A French general of the First

Empire, born in Geneva. He came to Paris (1787) as a watchmaker and was one of the leaders in the attack on the Bastille. He took part in all the great events of the early Revolution, but was too moderate for some of his fellows and was imprisoned during the Terror. On his release he entered the Italian army and in 1796 became Bonaparte's adjutant general and in 1802 a division general. He was appointed president of the military court which sentenced the Duke d'Enghien (1804), and he wrote, in the attempt to shift the blame on Talleyrand, *Explications offertes aux hommes impartiaux*, etc. (1824). He was made Count in 1809 and was one of Napoleon's most trusted servants. In 1812 he was Governor of Paris. When the Emperor was sent to Elba, Hullin tried to ingratiate himself with the new regime, but failed. In 1815, during the Hundred Days, he was again Governor of Paris, but afterward was banished to Brussels and lived for a time at Hamburg. He was pardoned in 1819 and returned to France.

HULLMANN, hul'man, KARL DIETRICH (1765-1846). A German historian, born at Eideborn and educated at Halle. He became in 1797 professor of history at Frankfurt-on-the-Oder and in 1808 at Königsberg. Ten years afterward he was made the first rector of Bonn and began his important service to that university. His principal works are *Deutsche Finanzgeschichte des Mittelalters* (1805), *Geschichte des Ursprungs der Regalien in Deutschland* (1806), *Geschichte des Ursprungs der Stände in Deutschland* (2d ed. 1830), *Geschichte des byzantinischen Handels* (1808), *Staatsrecht des Altertums* (1820), *Das Stadtrecht des Mittelalters* (4 vols. 1825-29), his most valuable work, *Römische Grundverfassung* (1832); *Staatsverfassung der Israeliten* (1834), *Handelsgeschichte der Griechen* (1839), *Griechische Denkmäler* (1840), *Geschichte des Ursprungs der deutschen Fürstentümer* (1842). Consult Delbriick, in *Allgemeine Zeitschrift für Geschichte*, vol. vi, pp. 1-14 (Berlin, 1846).

HULLSHOFF, BARONESS VON DROSTE. See DROSTE-HULLSHOFF.

HULSEAN LECTURES. A course of lectures given annually at Cambridge, founded by the Rev. John Hulse (1708-1790), of Elworth, in the County of Chester. He was educated at St. John's College, Cambridge, and at his death, Dec. 14, 1790, bequeathed the bulk of his property to his university. His will provided for the founding of two divinity scholarships in St. John's College, the Hulsean prize, the office of Christian advocate, and that of Hulsean lecturer or Christian preacher. By a statute confirmed by the Queen in council in 1860, the office of Christian advocate was changed into the Hulsean professorship of divinity. The office of Hulsean lecturer, or preacher, is an annual one; and the duty of the lecturer is to preach not fewer than four nor more than six sermons before the university in the course of the year. The first series was delivered by Rev. Christopher Benson. The list of Hulsean lectures, from their beginning in 1820 down to 1893, is given in Hurst, *Literature of Theology*, pp. 32-34, and to 1894 in Hunt, *Religious Thought in the Nineteenth Century*. The list from 1893-94 to 1908-09 inclusive is given in the *New Schaff-Herzog Encyclopedia of Religious Knowledge*, vol. v, p. 401 (New York, 1909). The name of

the year's lecturer may be found in *Whitaker's Almanack* (London, annually), and the complete list of lecturers from 1820 is given every year in the *Cambridge University Calendar* (Cambridge, annually).

HULTSCH, hulch, FRIEDRICH (1833-1906). A German philologist, born in Dresden. He was educated at Leipzig, where he taught in the Nikolaischule. After several years at Zwickau he became professor in the Kieuzschule of Dresden, of which he was rector from 1868 to his retirement, in 1889. Hultsch's special study was ancient mathematics. He edited the *Scriptores Metrolologici* (1864-66), *Heronis Geometrika et Stereometrika* (1864), *Polybi Historiæ* (1867-72), *Pappus* (1876-78), for a large part of the text an editio princeps, and *Autolyi de Sphæra quæ Movetur Liber* (1885). He wrote the very valuable *Griechische und römische Metrologie* (1862, 2d ed. 1882), *Die Elemente der ägyptischen Teilungsrechnung* (1895), *Die Gewichte des Altertums* (1898), *Die ptolemäischen Münz- und Rechnungsweiser* (1903).

HULTZSCH, hulch, EUGEN (1857-) A German Sanskritist. He was born in Dresden and was educated at Leipzig and Bonn. In 1882-86 he was lecturer at Vienna and then was government epigraphist of Madras until 1903, when he succeeded Pischel as professor of Sanskrit at the University of Halle. He edited *South Indian Inscriptions* (1890-1903), *Reports on Sanskrit Manuscripts in Southern India* (1895-1905), and *Epigraphia Indica* (1894-1906), and published several texts, including the *Bauddhayanadharmasūtra* (1884), *Annam-bhatta's Tarkasamgraha* (1907), *Simharaja's Prakritarupaiatara* (1909), and *Kalidasa's Megadūta* (1911).

HUMACAO, ō-ma-ka'ō. A city of Porto Rico, the capital of the department of the same name, situated on Humacao River, about 6 miles from the coast (Map Porto Rico, F 3). It lies in a beautiful valley, surrounded by mountains, and enjoys cool sea breezes, which give it an agreeable climate. It has a number of schools and a municipal library. Sugar cane and tobacco are produced in the surrounding lowlands, and coffee is grown on the slopes of the mountains. It was founded in 1793 and raised to the rank of a city in 1894. Population of the municipality in 1910, 26,678, urban population, 6541.

HUMAITÁ, ō-ma'ê-ta'. A town and fort of Paraguay, situated at the southwest end of the country, on the river Paraguay, near its confluence with the Paraná. During the Paraguayan War (1865-70) it was besieged for over a year by the forces of Argentina and Brazil and finally surrendered in 1868. The fortifications were razed at the end of the war. The surrounding region yields rich crops of cotton, tobacco, coffee, and sugar. Pop., about 4000.

HUMANE ASSOCIATION, AMERICAN. A federation of societies of the United States for the prevention of cruelty to animals and children, formed at Cleveland, Ohio, in 1877, at a meeting held to consider the maltreatment of animals in transit between the East and West. It became a national organization, whose purpose was at first to deal with interstate traffic. It sent representatives to influence legislation at Washington, and its agents investigated the abuses which prevailed on lines of railways transporting cattle. It offered a prize of \$5000

for the best model of a cattle car that would make possible the feeding, watering, and resting of cattle in transit, as the result of which many improved cars were brought into use. In 1884 it won a suit in Massachusetts against two leading railroads for violation of the law, thus establishing an important precedent. For many years its purpose has been that of a federation of all local humane societies. It carries on considerable work of an educational nature. It has instituted inquiries in the United States and abroad on the subject of vivisection in the schools and colleges. Prizes were offered, in 1900, to college and medical students, for essays on vivisection, its abuses and their remedy. In 1913, 310 societies having for their object the prevention of cruelty to animals or to children, or both, were represented in the association. The membership of these societies aggregated 141,000. The association has published, since 1913, the *National Humane Review*. See CRUELTY TO CHILDREN, CRUELTY TO ANIMALS, PREVENTION OF.

HUMANE SOCIETY, ROYAL. An organization for the recovery of persons apparently drowned, founded in England in 1774. It maintains receiving houses in appropriate places along the Thames and near canal banks and in various parts of London. The chief station is on the Serpentine, in Hyde Park, on ground given by George III, and was erected in 1794. The seal of the society bears the unique motto, *Lateat Scintilla Forsan* (A small spark may perhaps lie hid).

HUMANISM (from *human*, OF, Fr *humain*, from Lat *humanus*, relating to man, from *homo*, OLat *homo*, man, connected with AS *guma*, man, Gk *χῆμα*, *chthōn*, Skt *ksam*, earth). A name applied to the literary movement at the close of the Middle Ages whose object was the revival of the pagan learning of classical antiquity. The humanists from the beginning divided into two divergent schools, one of which sought to ingraft the classical learning on the tree of Christianity, while the other endeavored to revive not merely the literature of classical antiquity, but, through this, the pagan spirit of the ancient heathen cults. The first humanistic movement began in the fourteenth century in Italy where the political and social developments were preparing the way for a departure from mediæval traditions. The numerous small Italian states, despotic and republican alike, favored the development of individuality at a time when feudalism (qv), still in existence in other parts of Europe, gave less opportunity for the exercise of individual activities. The ferment of Italian politics gave the individual freer play, and the sense of personal independence was rapidly tending to looser social and political ideals. Paganism in Italy, though overpowered, had never been completely exterminated. It had lived on in popular legend and retrospective pride of race, and in countless associations connected with the Roman Forum, the Coliseum, and other historic monuments. But these survivals from ancient Rome were an insignificant moment in mediæval Italian culture, the pagan past did not seriously influence men's minds till new social and political conditions had prepared the way for the revival of classical ideals. (See RENAISSANCE.) The exile of the papal see from Rome for nearly three-quarters of a century (see AVIGNON) must also have acted as a removal of the great check

against the recrudescence of paganism. In the fourteenth century all Italy was astir with the new life. Dante, as is shown in his homage to Virgil, felt the new impulse. Petrarch, who may be regarded as the first Christian humanist, threw himself into the van of the new movement. His passion for antiquity and his intolerance of certain forms of mediævalism were boundless. He devoted great energy to the discovery and rescue of Latin manuscripts, to the collection of old Roman coins and other antiquities, and to scathing denunciation of scholastic philosophy, jurisprudence, and medicine. But while the mediævalist had looked forward to an immortality beyond the grave, the pagan humanist would be satisfied with nothing less than an earthly immortality, achieved by poetry like Virgil's and prose like Cicero's. And as the literary style of the Augustan age (qv) became the sole model for the writer, so the spirit of antiquity, with its sensuous attitude towards life and nature, its unqualified secularity, its abandonment to the charm of things seen and temporal, controlled the humanists' thought and conduct.

Consult Jakob Burckhardt, *Die Cultur der Renaissance in Italien* (Basel, 1860, 3d ed, 1877-78, Eng trans by Middlemore, London, 1878 and 1891), Georg Voigt, *Die Wiederbelebung des klassischen Altertums oder das erste Jahrhundert des Humanismus* (Berlin, 1859, 2d ed, 1880-81), L. Pastor, *History of the Popes* (2 vols, London, 1891), Symonds's (qv) works on the Renaissance, epitomized by Alfred Pearson in *A Short History of the Renaissance in Italy* (New York, 1893), John Owen, *Skeptics of the Italian Renaissance* (ib, 1893), F. A. Gasquet, *Eve of the Reformation* (London, 1898), R. C. Jebb, *Humanism in Education*, Romanes Lecture (New York, 1899), Lewis Einstein, *The Italian Renaissance in England* (ib, 1902), Ernst Borkowsky, *Aus der Zeit des Humanismus* (Jena, 1905).

A second humanistic movement—more properly called humanitarianism—came to its culmination in Comte's (qv) worship of humanity. It finds in man the highest and worthiest object of esteem and reverence and is hostile to any theory which places the divine outside of the human. It is differentiated from the pagan Renaissance attitude most markedly by its placing the golden age of man's development not in the past but in the future.

Still another humanistic movement is afoot in philosophical circles at the present day. This humanism is connected with pragmatism (qv) and is the theory that the working hypothesis of metaphysics should be the view that all nature is akin to man. Mechanism and the current presuppositions of natural science are discarded, and in their place a universal animism is assumed. F. C. S. Schiller (qv) goes so far as to attribute moral qualities to inanimate objects and accounts for the regularity of natural law by the analogy of statistical averages in human society and also by assimilating laws of nature to human habits. Consult F. C. S. Schiller, *Humanism* (New York, 1903), id, *Studies in Humanism* (ib, 1907), William James, *Pragmatism* (ib, 1907), J. S. MacKenzie, *Lectures on Humanism* (ib, 1907).

HUMANITARIANS (from Lat *humanitas*, humanity, from *humanus*, human). 1 The name assigned to the several classes of anti-Trinitarians, who regard Christ as a mere man

and refuse to ascribe to Him a supernatural origin or nature. Theodotus of Byzantium, called the Tannei, a Monarchian (qv), is said to have been excluded from the Church by Victor, Roman pontiff (189-198), because, having denied Christ in time of persecution, he afterward defended himself by declaring that in so doing 'he had denied not God, but man.' A contemporary and probably an associate of Theodotus, Artemas, taught in like manner that Christ was a mere man. Theodotus and Artemas probably represent a school or sect at Rome and were the first to formulate the doctrine, so far as known (See CHRISTOLOGY, SOGINUS, UNITARIANISM). 2 The name "humanitarian" is also sometimes applied to the disciples of Saint-Simon (qv) and in general to those who look to the perfectibility of human nature as their great moral and social dogma and ignore dependence upon supernatural aid, believing that man can attain his highest development by his own power.

HUMANITIES. A term now employed primarily to designate the study of the classical literatures of Greece and Rome, and the various sciences which deal with them, such as grammar, classical philology, etc., but sometimes secondarily it includes all "culture studies" in contrast to professional studies. Cicero, Aulus Gellius, and other Latin writers used *humanitas* in the sense of culture becoming to a man and gained by the study of the great masterpieces, mostly of Greek literature, but not exclusive of Roman. The scholastics adopted the term especially in the form of *literæ humaniores* (the more humane letters), but gave it a different emphasis by placing it in contrast and in subordination to *divinitas* (divinity or theology). This contrast gave to humanity an enlarged meaning, including all forms of secular learning. The humanistic movement (see HUMANISM) restored the word to its Ciceronian significance. But when the narrowness of humanism in regarding the study of the ancient classics as the means par excellence of gaining humane culture came to be appreciated, and when other sciences of liberal character arose, the term "humanities" began gradually to take on a larger meaning, and it is now used by some authorities to include all philological study, together with history, philosophy, political science, economics, and all other sciences which concern themselves with human civilization. In the Scottish universities, however, the singular, "humanity," is used to designate the study of the Latin language and literature. Consult Irving Babbitt, *Literature and the American College* (Boston, 1908).

HUMANN, hoo'man, KARL (1839-96). A German engineer and archaeologist, born at Steele. In 1861 he gave up his studies, as he was ordered south because of his health. In Samos he made successful excavations of the famous temple of Hera. In 1862 he built for Sir Henry Bulwer, English Ambassador at Constantinople, an island palace, two years later was employed by the Turkish government to survey Palestine for a projected railroad from Jaffa to the Dead Sea by way of Jerusalem, of which only the part from the coast to Jerusalem was completed, and, after a trip to Egypt, mapped out the Eastern Balkans, after surveys ordered by Fuad Pasha. But besides the name he made for himself by these maps and by engineering in northern Asia, he got

fame for his excavations at Pergamon (qv) (1873-86), was made honorary doctor by the University of Giefswald, director of the Museum of Berlin, and Privy Councilor (1894). His later excavations were at Zenjuli in northern Syria, at Tralles, and Magnesia. With Conze, Bohn, and others, he published *Die Ergebnisse der Ausgrabungen zu Pergamon* (1880-88) and, with Puchstein, *Reisen in Kleinasien und Nordsyrien* (1890, with maps).

HUMAYUN, hoo'ma-yoon' (1508-56). A Great Mogul of India, son of Baber and father of Akbar. He came to the throne in 1530, but after 10 years of warfare was defeated by the Afghan Sher Shah and driven from India. He took refuge at the court of Persia and with a Persian army returned and recovered control of Delhi and Agra in 1555. He died at Delhi, where a great mausoleum was built for him.

HUMBER. The continuation and estuary of the rivers Ouse and Tient, between the English counties of York and Lincoln (Map England, F 3). It is 38 miles long and from 1 to 7 miles broad with Hull on its north shore and Great Grimsby on the south. Many shoals occur, and the sailing routes have been very carefully buoyed. Canals connect it with south Yorkshire and Trent. It was the entrance for the Norse invasions of the ninth and tenth centuries.

HUMBERT I (It. UMBERTO, oom-bèr'tò) (1844-1900). King of Italy from 1878 to 1900. He was the eldest son of Victor Emmanuel II and Adelaide, Archduchess of Austria, and was born at Turin, March 14, 1844. At an early age he obtained an insight into political and military life under the guidance of his father during the War of 1859. He held the rank of captain, although he was then too young to take an active part in the struggle. He was more closely connected with the process of the unification of Italy which followed. In July, 1862, he visited Naples and Palermo, where he shared the popularity of Garibaldi. When the war between Prussia and Austria was imminent, Humbert was dispatched to Paris to ascertain the sentiments of the French government in reference to the alliance between Italy and Prussia. On the outbreak of hostilities he hastened to take the field, obtained the command of a division of General Cialdini's army with the rank of lieutenant general, and took a gallant part in the battle of Custoza, June 24, 1866, covering the retreat of the Italians by brave and skillful tactics. In 1868 he married his cousin, the Princess Marguerite of Savoy. He succeeded to the throne on the death of his father, Jan 9, 1878. He showed great bravery and contributed generously towards the relief of suffering during the cholera epidemic in 1884 and gained in popular esteem by his visit to Naples at that time. In 1887 the foreign policy of the government resulted in the Triple Alliance between Italy, Austria-Hungary, and Germany, which was so helpful to Irredentism (qv). The colonial policy of the country was not so successful, however, as the Italian troops met with great reverses in Abyssinia in 1887 and again in 1895-96. In 1898 a commercial treaty was concluded with France, but throughout Humbert's reign the country suffered under financial depression and heavy taxation. Towards the end of his reign King Humbert lost some of his former popularity. An anarchist attempted to assassinate him before the gates

of Rome in 1897, but failed. Three years later, however (July 29, 1900), Humbert was shot at and mortally wounded by another Italian anarchist, Bresci, who had come from the United States intent on this act. The King died almost immediately. Humbert was succeeded by his only son, Victor Emmanuel III. His character is summed up in his popular title "Humbert the Good." Consult Fedele Lampertico, "Discurso in Memoria di S. M. Umberto I^o, Re d' Italia," in R. Istituto Veneto, *Atti*, vol. IX, part 1 (Venice, 1900-01), and Pietro Vigo, *Annali d' Italia Storia degli ultimi trent' anni del secolo 19* (5 vols., Milan, 1908-11). See ITALY.

HUMBERT, ün'ber', GUSTAVE AMÉDÉE (1822-94). A French jurist and politician, born at Metz. He studied law in Paris and gave private lessons both before and after he was underprefect of Diedenhofen (1848-51), was professor of Roman law at Toulouse and in 1871 was elected to the Chamber of Deputies. Humbert took a prominent part in debates on legal questions, became a leader of the Republican Left in 1875, was made a life senator, and in Freycinet's cabinet (1882) was Minister of Justice. In 1890 Humbert left his post as Vice President of the Senate and became president of the chief court of accounts. He wrote *Essai sur les finances et la compatibilité publique chez les Romains* (2 vols., 1857) and *Organisation de l'empire romain* (1892). His connection with the great Humbert swindle, carried through by his son, Frédéric, and his daughter-in-law, Frédéric's wife, is problematic.

HUMBERT, JACQUES FERDINAND (1842-) A French painter, born in Paris. He studied at the Beaux-Arts and with Picot, Cabanel, and Eugène Fromentin. His first appearance in the Salon was in 1865, with "The Flight of Nero." He was made an Officer of the Legion of Honor in 1885, a professor at the Beaux-Arts, and is regarded as one of the most authoritative exponents of modern classic style. Among his paintings are "The Christ," at Orléans, "Pro Patria," a decoration for the Panthéon, "John the Baptist," at Havre, "The Virgin with Jesus and John the Baptist," in the Luxembourg.

HUMBLEBEE. See BUMBLEBEE.

HUMBLEDON HILL. See HOMILDON.

HUMBOLDT, hūm'bōlt. A city in Allen Co., Kans., 60 miles southeast of Emporia, on the Neosho River, and the Missouri, Kansas, and Texas and the Atchison, Topeka, and Santa Fe railroads (Map Kansas, G 7). It is in a natural-gas and oil region, has farming interests and oil refineries, and manufactures flour, Portland cement, bricks, tile. The water works are owned by the city. Pop., 1900, 1402, 1910, 2548.

HUMBOLDT. A city in Gibson Co., Tenn., 85 miles east of Memphis, on the Forked Deer River, and on the Mobile and Ohio and the Louisville and Nashville railroads (Map Tennessee, B 3). It is in a rich cotton and fruit growing region, the products of which are shipped in large quantities. The industrial establishments include marble and granite works, cotton mills, a large fruit-packing plant, flouring mill and elevator, brickyards, canning factory, cotton gins, etc. Humboldt owns its water works and electric-light plant. Pop., 1900, 2866, 1910, 3446.

HUMBOLDT, hūm'bōlt, *Ger. pron. hūm'bōlt*, ALEXANDER, BARON VON (1769-1859). A Ger-

man naturalist and traveler. He was born in Berlin, Sept. 14, 1769. His father, who died in 1779, was a chamberlain to the King of Prussia, his mother was of Burgundian descent, and his youthful life was spent in the old castle of Tegel, near Potsdam. He studied, in company with his brother Karl Wilhelm (qv), first under private tutors, then at the universities of Frankfurt-on-the-Oder, Berlin, and Göttingen. His preference for scientific studies was strongly manifested in his early years and highly developed by the influence of Blumenbach and other university instructors. During his residence at Göttingen (1788 and 1789) he made geological examinations in the Harz Mountains and Rhine valley, which resulted in his first important publication, *Ueber die Basalte am Rhein, nebst Untersuchungen über Syenit und Basanit der Alten* (1790). In 1790 Humboldt made a tour through France, the Netherlands, and England, in company with Georg Forster, already eminent as a scientific traveler, whose influence was strong in shaping the younger man's career, and in 1791 he entered the Academy of Mining at Freiberg, Saxony, where Werner was then professor of geology. His eight months' residence at Freiberg gave him materials for several technical papers in chemistry and physics, and for some more elaborate essays, especially those upon the cryptogamous plants of the mines (*Flora subterranea Freibergensis*, etc.). In consequence he was soon (1792) appointed superintendent of mines in the principalities of Bayreuth and Ansbach and resided for the next three years at Bayreuth. The breadth of his interest and researches at this period is exemplified by his work and speculations on the nature of muscular and nervous force, entitled *Versuche über die gereizte Muskel- und Nervenfasern, nebst Vermutungen über den chemischen Prozess des Lebens in der Tier- und Pflanzenwelt* (1797).

The desire for larger freedom and especially for exploratory travel led Humboldt to resign his office in 1797. He had already in 1795 wandered about the Alps, studying geology, but further intended journeys to Sicily and up the Nile were prevented by political obstacles. The next three months were spent at Jena, in intimate association with Goethe, Schiller, and the men at the university, who then made an extraordinary circle of intellects, and here he began to plan for the great journey to Spanish America with which his fame is now most closely associated. In Paris he made the acquaintance of a talented young French botanist, Aimé Bonpland, who joined in his plans and was destined to be his principal collaborer. Meanwhile Humboldt was incessantly at work, and the years 1797-99 witnessed the publication of many notable contributions to science, among which those pertaining to the composition of the atmosphere were particularly notable. Many of these were brought together in his book *Versuche über die chemische Zerlegung des Luftkreises* (1799). At length, after spending some time in Spain and getting letters from the government, Humboldt and Bonpland sailed in a Spanish frigate from Coruña, in June, 1799. They visited Teneriffe, ascended the peak, and made valuable observations there as well as at sea during the voyage, which terminated at Cumana in Venezuela.

The travelers explored the region for upward of a year, crossing over to the upper waters of the Orinoco, and establishing the connection between that stream and the upper Amazon. The

year 1801 was spent in explorations in Cuba, the basin of the Magdalena River, and in the Andes of Quito, the famous ascent of Chimborazo, to an altitude of about 19,000 feet, being accomplished in June, 1802. The explorations were then extended to Peru, where Humboldt devoted himself largely to the electrical and astronomical studies favored by the climate, but also acquired a valuable knowledge of the cinchona (quinine) plant and its culture. From Peru the two savants took ship for Mexico, landing at Acaapulco in February, 1803. There they traveled for a year, Humboldt paying special attention to the determination of positions on the map and to volcanic phenomena, and then returned to Europe by way of Cuba and the United States (where several weeks were spent), reaching Bordeaux in August, 1804.

Humboldt now went to Paris and occupied himself with Bonpland in the arrangement of their manuscripts and collections, a large part of which, however, had been lost by a shipwreck, at the same time he pursued continuous experiments in physical chemistry. Having visited his brother, then Prussian Ambassador at Rome, and returned to Berlin, he accompanied Prince Wilhelm of Prussia, in 1807, on a political mission to France, and obtained leave from the government of his own country to remain thenceforth in Paris for the publication of the account of his travels. He enlisted the cooperation of Gay-Lussac, Cuvier, and many others of the most eminent French specialists of the day in the elaboration of his materials, and began in 1807 to publish the results in magnificent volumes (20 in folio and 10 in quarto, illustrated by 1425 copperplates). The title was *Voyage aux régions équinoxiales du Nouveau Continent fait en 1799-1804 par Alexandre de Humboldt et Aimé Bonpland*. The first 14 volumes were devoted to botany and were actually prepared mainly by C. S. Kunth, vols xv and xvi were an "atlas pittoresque", vols xvii, xviii, xix, xxi, and xxii were devoted to physical geography, geognosy, and astronomy, vol xx contained a "geography of plants", vols xxiii and xxiv were zoological, vols xxv and xxvi were devoted to a sociological account of the countries of Spanish America, and vols xxviii, xxix, and xxx contained Humboldt's narrative of his journey, which was left unfinished. The original of this work contains the *Essai politique sur le royaume de la Nouvelle Espagne*, the *Essai politique sur l'île de Cuba*, and the *Vues des Cordillères*. Among the minor works of the great master, the *Ansichten der Natur* (1st ed., 1808) had an immediate and widespread welcome. It was translated into almost every European language and issued in English in both London and Philadelphia. The publication of the great *Voyage* continued at irregular intervals until 1827, and the volumes or groups of volumes appeared under individual titles, by which they are more usually known. The bibliography of Bruhns's biography of Humboldt disentangles the confusion of titles and editions which resulted, and to that the curious reader is referred. After Humboldt's death an octavo edition of his principal works was published in Paris (1864-66).

The favor of Frederick William III of Prussia, who had settled upon Humboldt a pension of 2500 thalers and later of 5000, required him to make frequent journeys with that monarch and at last he was summoned to reside at the court. In 1827, then, he took up his permanent resi-

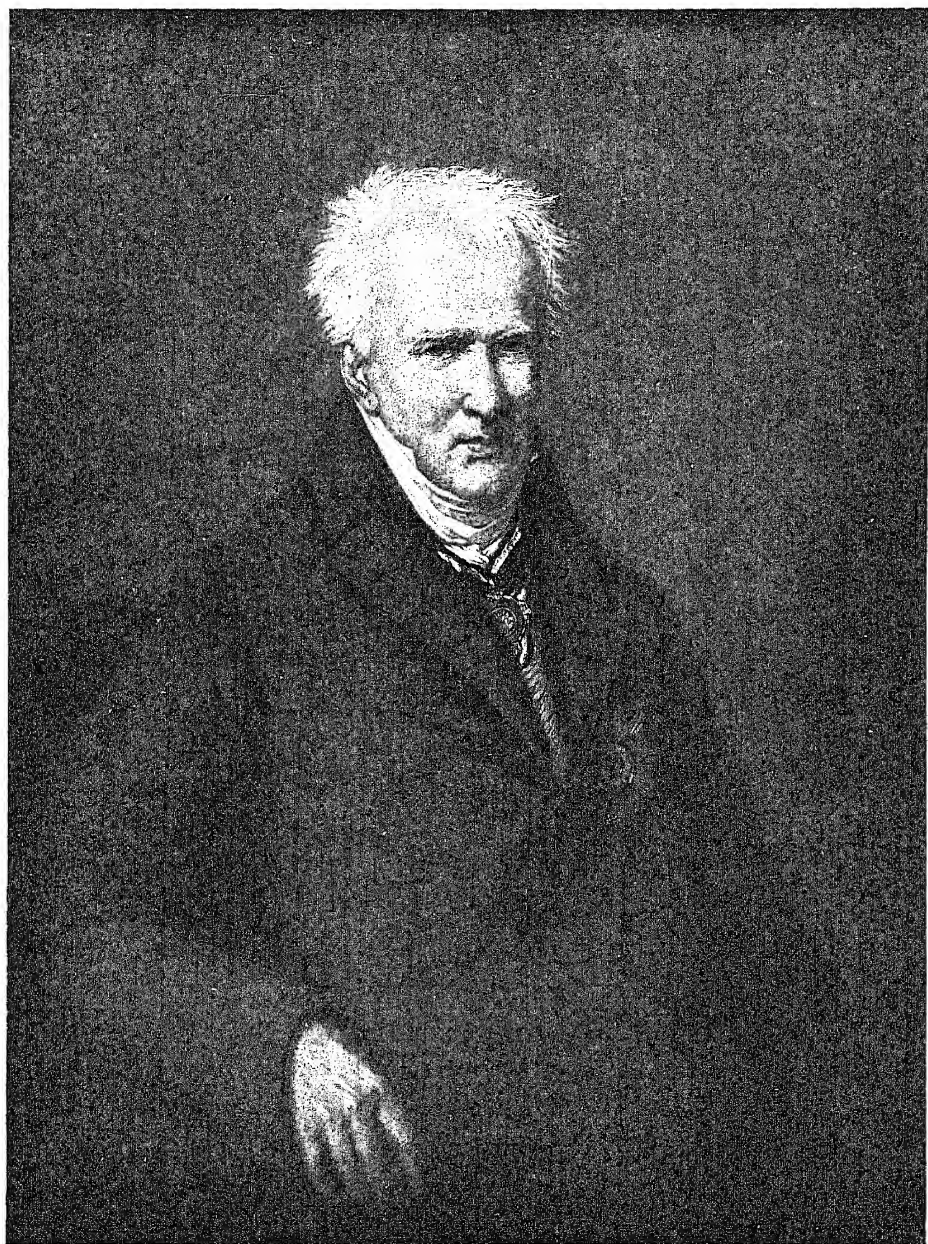
dence in Berlin, and with much discontent endeavored to carry on his investigations amid uncongenial surroundings. One of the best results of his work at this period was his success in establishing for the first time international cooperation in furtherance of scientific observations. In 1827-28 he gave a series of remarkable lectures on physiography at Berlin, which formed the basis of his subsequent *Kosmos*. In 1829, under the patronage of the Russian government and accompanied by Ehrenberg and Gustav Rose, he made a rapid journey as far east as the Yenisei, one of the most striking results of which was the discovery of diamonds and other precious stones in the Ural Mountains, as Humboldt had predicted would be the case from his knowledge of their geology. Many geographical positions were astronomically determined, and erroneous views as to the physical geography of the northern interior of Russia were corrected. The record of this journey was first written by Humboldt as *Éragments de géologie et de climatologie asiatique* (1831) and afterward enlarged into *Asie centrale, recherches sur les chaînes de montagnes et la climatologie comparée* (1843).

The subsequent years were spent in occasional diplomatic journeys and in the preparation of what he deemed the crowning monument of his intellectual life, his *Kosmos*, an encyclopedic account and explanation of the physical universe. Four volumes were written and published in Berlin, in 1845, 1847, 1850, and 1858. They were translated as fast as issued into many languages and created a profound impression.

He kept health and vitality and continued at work until the winter of 1858-59, when his strength declined. He died May 6, 1859, and was buried with royal honors at Tegel. After his death new editions of many of his works were issued, and several collections of his letters appeared.

Humboldt's influence upon scientific thought has been vast and far-reaching. "With him," says Agassiz, "ends a great period in the history of science—a period to which Cuvier, Laplace, Arago, Gay-Lussac, De Candolle, and Robert Brown belonged." His grasp of the universe as a whole was no less remarkable than his faculty of observing and explaining single phenomena. His scenic descriptions are strikingly picturesque. Humboldt has contributed to nearly every branch of science, either by direct investigation or by the accumulation of valuable material. He may be regarded as the founder of the modern science of physical geography, and he placed meteorology upon a firm basis. We can only allude to his observations on the cultivation of the soil in different climates and its effect upon civilization, his study of the languages, the architecture, and the customs of the ancient peoples of South and Central America, his discovery of the decrease in intensity of the earth's magnetic force from the poles to the equator, his fruitful labors in chemistry with Gay-Lussac, his experiments concerning the respiration of fishes, and his contributions to the science of geology (especially in the departments of petrography, vulcanology, and seismology).

Humboldt's published correspondence with some of the most distinguished men of his time, such as Goethe, Varnhagen, Pictet, Bunsen, Gauss, and Raumer, as well as with his brother Wilhelm, attests the almost unparalleled breadth of his intellectual interests. Consult R. H. Stoddard, *Life, Travels, and Books of Alexander*



ALEXANDER VON HUMBOLDT

FROM AN ENGRAVING BY P. HABELMANN, AFTER A PAINTING BY EMMA RICHARDS

von Humboldt (New York, 1860), P F H Klencke, *Alexander von Humboldt's Leben und Wirken, Reisen und Wissen* (6th ed, Leipzig, 1970), C C Bruhns and others, *Eine wissenschaftliche Biographie* (3 vols, ib, 1872)

HUMBOLDT, KARL WILHELM, BARON VON (1767-1835) An eminent German philologist, author, and statesman, elder brother of the preceding, born at Potsdam, Prussia, June 22, 1767. He was educated at the universities of Frankfurt-on-the-Oder, Göttingen, Jena, and Berlin, where he was especially trained in jurisprudence, but also studied æsthetics, antiquities, and the Kantian philosophy, then newly propounded. After continental travel he spent some time in 1789-90 at Erfurt and at Weimar, where he met Schiller (then professor extraordinarius at Jena), with whom he formed a lasting friendship. In 1790 he became referendary in the Supreme Court of Judicature at Berlin, with the title of Prussian Councillor of Legation, but in 1791 resigned his appointment, and in 1794-97 was at Jena, active in scientific and literary study, and one of the Schiller circle. His interesting correspondence with Schiller, extending from 1792 to 1805, was published by him in 1830 with a "Vorerinnerung" (2d ed., by Vollmer, 1876, in the *Cotta'sche Bibliothek*, ed by Muncker, 1893). From 1801 to 1806 he was Prussian Resident Minister at the papal court and in 1806-08 Minister Plenipotentiary. At Rome he was a most liberal patron of artists, including Rauch and Thorvaldsen, made philosophical, æsthetic, philological, and archæological researches, and wrote the elegy *Rom*, his most ambitious poem. In 1809 he was appointed Privy Councillor of State, in charge of public worship and education. After a successful administration, which introduced many reforms and organized and obtained endowment for the Berlin University (decreed 1807, opened 1810), he resigned the post in 1810, to accept that of Envoy Extraordinary and Minister Plenipotentiary at Vienna, with rank of Minister of State. In the political affairs of the time he took a prominent part. He was present at the Peace Congress of Prague in 1813, where he, almost single-handed, brought about the alliance of Austria with Russia and Prussia against France. In 1814 he was at the Congress of Châtillon and signed, with Hardenberg, the first Paris Treaty, and in 1814-15 attended the Vienna Congress as Prussia's Second Plenipotentiary. Humboldt likewise took part in the negotiations attending the conclusion of the second Paris Treaty, and was a member of the Territorial Commission at Frankfurt-on-the-Main in 1816-17. As a State Councillor, he strongly disagreed with Chancellor Hardenberg on certain matters of tax reform, and in consequence he was sent to London as Ambassador. He returned in 1818 to attend the Congress of Aix-la-Chapelle and in 1819 was appointed to the Ministry of the Interior (then divided into two branches), with the department of communal and municipal affairs. His liberal opinions soon involved him in difficulties with the government. He demanded a new Prussian constitution which should combine the autonomy of provinces and governmental districts, with a parliament chosen by direct election, and he attacked the Carlsbad decrees, which among various provisions established a censorship of the press and contained measures hostile to the universities and schools. Dismissed in 1819, he was not recalled to the Coun-

cil of State until 1830. In the last years of his life Humboldt devoted much attention to art matters and to the organization of the Berlin Museum. He died April 8, 1835, at Tegel.

As a statesman, Wilhelm von Humboldt was enlightened and industrious, but perhaps hardly constructive. As a critical essayist, he was of transient influence. Of his poetical works, besides the *Rom* above mentioned, only the translation of the *Agamemnon* is now much read (1816, 2d ed, 1857, in the *Universalbibliothek* of Reclam). But, as a philologist, he marks an epoch. It was he who first called the attention of scholars to the phenomenon of the Basque language, particularly in the volume *Prüfung der Untersuchungen über die Urbevölkerung Hispaniens vermittelt der baskischen Sprache* (1821). His chief publication, *Über die Kausprache auf der Insel Java* (3 vols., 1836-40), with its noted introduction, "Über die Verschiedenheit des menschlichen Sprachbaues" (separately printed 1835, 3d ed of Pott's revision, 1880), was the first on the subject. Important dissertations read before the Berlin Academy include those on the comparative study of language, the province of the historian, and the origin of grammatical forms. Humboldt was in these and other writings the first to associate the science of comparative philology with philosophy, history, and other collateral studies, and to give it a universal significance. His *Ideen zu einem Versuch, die Grenzen der Wirksamkeit des Staates zu bestimmen* (ed by Cauer, 1851, in Reclam's *Universalbibliothek*), which Schiller vainly tried to get published, limits the authority of the state to the inferior task of protecting the life and property of its citizens. The collected works appeared at Berlin (7 vols.) in 1841-52. Consult Robert Haym, *Wilhelm von Humboldt, Lebensbild und Charakteristik* (Berlin, 1856), Adler, *Wilhelm von Humboldt's Linguistical Studies* (New York, 1866), Gebhardt, *Wilhelm von Humboldt als Staatsmann* (2 vols, Stuttgart, 1896-99), Kittel, *Wilhelm von Humboldts geschichtliche Weltanschauung* (Leipzig, 1901).

HUMBOLDT BAY INDIANS See WYAT STOCK

HUMBOLDT RIVER The longest river of Nevada. It rises in Elko County, in the northeast corner of the State, and flows 350 miles in a generally southwest direction, emptying into Humboldt Lake, or Sink, in Churchill County, 80 miles northeast of Carson City (Map Nevada, C 2). This "lake" is simply an expansion of the river and is held by a great gravel bank which was thrown entirely across the valley by the currents of the lake which once occupied this region and was about 500 feet deep at this point. Now the water sometimes evaporates faster than the river can supply it, at times of high water it formerly overflowed into Carson Sink, but this is now prevented by a dam. The river is only a few yards wide and grows smaller by evaporation towards its mouth. Its water is saline, and it flows through an arid and barren region covered with sagebrush, with the exception of a few fertile alluvial plains and clumps of willows. The valley of the Humboldt is flanked by rugged peaks, some of which reach an altitude of 11,000 feet above sea level, it is the only east and west pass through the mountains of Nevada, and it is followed throughout its course by the Southern Pacific Railroad. See GREAT AMERICAN DESERT.

HUME, ALEXANDER HAMILTON (1797-1873)

An Australian explorer, born in Parramatta in New South Wales. At the age of 17, accompanied by a younger brother, he discovered the Berrima country. In 1817 he was one of the discoverers of Lake Bathurst. He is best known as leader with Hovell of the cross-country expedition of 1824, on which, when question arose as to the part he had taken in it, he wrote *A Brief Statement of Facts in Connection with an Overland Expedition from Lake George to Fort Phillip, in the Year 1824* (3d ed., 1874), and, with Hovell, *Journey of Discovery to Fort Phillip* (1837). He accompanied Sturt (qv) in his first exploration. A county in New South Wales, a mountain range in Victoria, and the Murray River (as an alternative title) bear the name of Hume.

HUME, DAVID (1711-76) An English philosopher and historian. He was born at Edinburgh on April 26 (O S), 1711. His father was the laird of Ninewells in Berwickshire, but David, being the youngest son, had to make his fortune with no other assistance than an education and the influence of his family. He appears to have studied in the University of Edinburgh when 12 years of age, but his education for the most part consisted in home reading. His family designed the law to be his profession, and he submitted to the initial steps of the proper practical training, but it was not a pursuit to his liking. Deserting it, he experimented in a mercantile house in Bristol, but commerce was not more congenial to him than jurisprudence, and he gave it a very short trial. To use his own words, "I now went over to France with a view of prosecuting my studies in a country retreat, and there I laid the plan of life which I have steadily and successfully pursued. I resolved to make a very rigid frugality supply my deficiency of fortune, to maintain unimpaired my independency, and to regard every object as contemptible except the improvement of my talent in literature." He spent much of the next three years at La Flèche in intercourse with the Jesuits, and then he wrote his *Treatise of Human Nature*, which, however, he did not publish till 1739-40. It consists of three books, "Of the Understanding," "Of the Passions," and "Of Morals." Now one of the three or four most famous philosophical productions of England, at the time of its appearance "it fell deadborn from the press without reaching such a distinction as even to excite a murmur among the zealots," as Hume himself acknowledged, much to his mortification. He now turned to political theory and published anonymously in 1741-43 two volumes of *Essays Moral and Political*. In 1744 he was a candidate for the chair of "ethics and pneumatic philosophy" in the University of Edinburgh, but his *Treatise* had given him a reputation for "heresy, deism, skepticism, atheism, etc.," and the university would have none of him. In 1746 he obtained a "very genteel" appointment as secretary to General Saint Clair on "10 shillings a day, perquisites, and no expenses." An expedition had been planned to Canada, but an unsuccessful attack on L'Orient in France led to a recall of the general. Two years after Hume accompanied General Saint Clair to the court of Turin, as secretary and aid-de-camp, and took notes of his impressions of Holland, Germany, and Italy.

In 1748, during his absence on the Continent, he published his *Enquiry Concerning Human Understanding*. The following year he returned to

England, in 1751 he gave to the public the *Enquiry Concerning the Principles of Morals*, and in 1752 the *Political Discourses*, said to have been the "cradle of political economy." At the same time he also composed *Dialogues on Natural Religion*, which, however, were not published till after his death. By this time he had put by enough money to gain him an income of £50 a year. Besides he had "a hundred pounds' worth of books, great stores of linens and fine clothes, and near £100 in his pocket, along with order, frugality, a strong spirit of independency, good health, a contented humor, and an unabated love of study," as he himself relates. In 1751 he had removed to Edinburgh, and a year later he was elected librarian to the Faculty of Advocates at a salary of £40. In 1754 he published the first volume of the *History of Great Britain, Containing the Reign of James I and Charles I*, the second volume appeared two years afterward. Then he took up the Tudors and, working backward, finished his *History of England* in 1762. In 1757 he had published *Four Dissertations: the Natural History of Religion, of the Passions, of Tragedy, of the Standard of Taste*. In 1763 he was a member of the embassy to France under Lord Hertford and here found himself famous. He was honored by the society ladies, fêted by the nobles, and taken by the men of letters into their friendship. After his return he was made Undersecretary of State (1767-69) and by 1769 had an income of £1000 a year. In 1770 he retired from public life and built a home in Edinburgh on a new street, which was jocularly called St David's Street, after him. Here he wrote *My Own Life*, and here he died, Aug. 25, 1776. His *History of England* became a classic as soon as it appeared, his economic writings were a fitting prelude to those of his friend Adam Smith (qv), while his philosophical works roused Kant "from his dogmatic slumber," gave rise by reaction to Scottish philosophy, and are among the most important of modern philosophical works. His philosophy was but the consistent development of Berkeley's idealism. (See BERKELEY.) Berkeley had denied the reality of matter and had accounted for what passed for matter by making it a complex of ideas, but he still held to the reality of mind as the percipient of ideas. Hume, claiming to find no empirical evidence for the existence of mind or spirit in Berkeley's sense of the term, dropped out mind as Berkeley had dropped out matter and thus left nothing to be known except "perception" (impressions and ideas), together with certain fictions of the imagination, of which he gives no satisfactory account that can be made consistent with his general position. "All the perceptions of the human mind resolve themselves into two distinct kinds which I shall call impressions and ideas." These differ not by reason of any differences in the manner in which they are produced, but merely in priority and liveliness. Ideas are simply those perceptions which, appearing later than similar perceptions, are less forceful and vivid. Ideas are of two sorts—ideas of the memory and ideas of the imagination. Of these the former are the more lively and retain in great measure the order and sequence of these original impressions, whereas ideas of the imagination are fainter and are "not restrained to the same order and form with the original impressions." Ideas are associated in accordance with certain principles, viz., "resemblance, contiguity in time or place, and cause

and effect." There are no abstract ideas. Ideas of space are complexes of *minima visibilia*, or colored points, disposed in a certain manner. These points are indivisible. Ideas of time are derived from the succession of our perceptions, and as these perceptions are in the last instance indivisible, time is not infinitely divisible. A perception and a thing perceived are one and the same thing. A cause is an object precedent and contiguous to another, and so united with it in the imagination that the idea of the one determines the mind to form the idea of the other, and the impression of the one to form a more lively idea of the other. "There is no substance, hence no mind except the bundle of perceptions. A true skeptic will be diffident of his philosophical doubts as well as of his philosophical convictions." Skepticism is inevitable on this theory, inasmuch as belief is the liveliness of one's ideas, and this varies from time to time. Hume himself admitted that when he left his study and entered upon practical affairs his philosophy made small appeal to him. Philosophical arguments control only when one is in a philosophical mood, at other times human nature prompts to the beliefs which philosophy shows to be without rational foundation. In ethics Hume was a utilitarian. (See UTILITARIANISM.) Self-love cannot be the sole basis of reasonable action. "Crucial experiments" render such a view impossible. Sympathy is a real principle in human nature, and reflections on public interest and utility are the sole sources of the moral approbation paid to fidelity, justice, veracity, integrity. Sympathy does the work it does because it is our pleasure in other persons' pleasures and our displeasure in their pains. Thus, our own pleasure and pain are the springs of action, but they are not the ends of action.

A complete edition of Hume's philosophical works was published by Green and Grose (4 vols, London, 1874-75), his *Treatise* and two *Enquiries* in two volumes by Selby-Bigge (Oxford, 1889-94), his *History* has appeared in almost innumerable editions, his autobiography was edited by Adam Smith (London, 1777). Consult also J. H. Burton, *Life and Correspondence of David Hume* (Edinburgh, 1846), T. H. Huxley, *Hume*, "English Men of Letters Series" (New York, 1879). For treatment of Hume's philosophy, consult Friedrich Jodl, *David Humes Lehre von der Erkenntnis* (Halle, 1871), Edmund Pfleiderer, *Empirismus und Skepsis in David Humes Philosophie* (Berlin, 1874), Meinong, *Hume-Studien* (Vienna, 1877-82), Georg von Gizycki, *Die Ethik David Humes* (Berlin, 1878), T. H. Green, *Introduction to Hume*, in Green and Grose's edition of Hume's works, also published as part of vol. II of Green's *Works* (London, 1885), W. A. Knight, *Hume* (ib., 1886), T. H. Huxley, "Hume with Helps to the Study of Berkeley," in *Collected Essays*, vol. VI (New York, 1902), Otto Quast, *Der Begriff des Belief bei D. Hume* (Halle, 1903), Oster, *Grosse Denker*, vol. II (1911), A. Seth, *English Philosophers and Schools of Philosophy* (London, 1912); and the various histories of modern philosophy by Ueberweg-Heinze, Falckenburg, Hoffding, Windelband, and Thilly.

HUME, JOHN See HOME, JOHN

HUME, JOSEPH (1777-1855) A British political reformer, born Jan. 22, 1777, at Montrose, Scotland. He was educated in the local schools of Montrose and at the age of 13 was apprenticed to an apothecary. He studied medi-

cine, was admitted in 1796 a member of the College of Surgeons, Edinburgh, and became assistant surgeon in the marine service of the East India Company. He applied himself to the native languages and during the Mahratta War, from 1802 to 1807, filled the office of Persian interpreter to the army. He also discharged duties connected with the prize agencies and the commissariat and arrived in England in 1808, with a fortune of £30,000 or £40,000. He spent some years in travel and study and published a blank-verse translation of Dante's *Inferno* in 1812. By purchase he entered the House of Commons in 1812 as a Tory for the Borough of Weymouth. In 1818 he was elected for the Aberdeen district of burghs, comprehending his native town of Montrose. In 1830 he had gained such distinction as a radical reformer that he was returned unopposed as one of the members for Middlesex, which he represented until 1837. In 1842 he was again chosen for his native burgh, Montrose, and remained until his death in the service of his fellow townsmen. As leader of the Radical party in the House of Commons, he usually found himself in active conflict with both Whig and Tory governments and at first was treated with contemptuous tolerance. He was particularly active for the retrenchment of public expenditures, the abolition of imprisonment for debt and of flogging in the army, and the repeal of laws which operated to the disadvantage of artisans. He discovered the widespread conspiracy of the Orange lodges to make the Duke of Cumberland King at William IV's death, and a tardy but sincere homage was paid to his integrity and public services by Sir Robert Peel and other political opponents. He held various public offices, was a prominent member and leader of several notable societies, was twice elected lord rector of Aberdeen University, and promoted the establishment of Lancasterian schools. He died Feb. 20, 1855.

HUME, MARTIN ANDREW SHARP (1847-1910). An English historian, long a resident of Spain. His own name was Martin Andrew Sharp, the "Hume" having been assumed as a condition of receiving a legacy from a Spanish-English relative, who was a Hume. He was born in London, was educated at Madrid, and became editor of the Spanish State Papers in the Public Record Office, London. He saw active service with the Turks in 1878-79, and traveled extensively in Central and South America. His writings, largely concerned with Spanish-English relations, literary and other, in spite of a style and methods occasionally journalistic, had real merits which academic historians and critics did not always recognize. Notable among them are *Philip II of Spain* (1897), *Spain: Its Greatness and Decay, 1479-1789* (1898, revised by Armstrong, 1913), *Modern Spain, 1788-1898* (1899, new ed., 1906), *The Spanish People* (1901), a popular recasting of the two preceding works, *The Love Affairs of Mary Queen of Scots* (1903), in which his patient research and gift of picturesque narrative are in evidence, *Spanish Influence on English Literature* (1905), which has too many marks of hasty improvisation, *Queens of Old Spain* (1907), *The Court of Philip IV, Spain in Decline* (1907), *Two English Queens and Philip* (1908), *Queen Elizabeth and her England* (1910), and a posthumous volume, *True Stories of the Past* (1910).

HUME, or HOME, SIR PATRICK (1641-1724) A Scottish statesman. Born at Polwarth, Berwickshire, he was brought up a strict Presbyte-

man, and after a term of law study at Paris he represented his native county in Parliament, where he at once took a foremost place as defender of the Covenanters. He went so far as to bring imprisonment upon himself, and on being freed was suspected of complication in the Rye House Plot, so that he was forced to remain in hiding until he could escape in disguise to the Continent. There he joined the Duke of Argyll and embarked with him on the unsuccessful expedition to Scotland (1685). Hume became a refugee with a price set upon his head, but he once more escaped abroad and lived at Utrecht under the name of "Dr. Wallace," professing to be a Scottish surgeon. He returned with William of Orange at the revolution of 1688. With estates restored, he was now a Scottish peer, Lord Polwarth, was made Lord Chancellor in 1696 and Earl of Marchmont in 1697. He strenuously opposed in Parliament the claims of the Old Pretender to the crown and voted for the union of Scotland with England, though he was not above the suspicion of having received a reward for so doing. Too dogmatic to be popular, he did not hold office in the United Kingdom till the reign of George I, when he was given some minor charges, but shortly retired.

HUMERAL VEIL (Lat *humeralis*, covering for the shoulders, from *humerus*, *umerus*, shoulder, connected with Gk *ἄμος*, *amos*, Goth *amsa*, Skt *amsa*, shoulder). An oblong veil of silk, either white or of the color prescribed for the day, which is worn over the shoulders by the subdeacon in the mass, when he holds the paten from the offertory to the patenoster, and by the priest in giving benediction or carrying the Blessed Sacrament in procession. See **COSTUME**, **ECCLESIASTICAL**.

HUMERUS (Lat, shoulder). The largest and longest bone of the upper extremity, the bone of the arm proper, extending from the shoulder to the elbow. It is divided anatomically into a shaft and two extremities. The upper extremity is rather the larger and has a semiglobular head which is partially received into the shallow glenoid cavity of the scapula, or shoulder blade, forming a ball-and-socket joint. Two processes or projections of the shoulder blade assist the glenoid cavity in completing the cavity or seat of the head of the humerus. There are three ligaments which hold the humerus to the scapula—the capsular, the coracohumeral, and the glenoid, the relations being somewhat similar to those of the hip joint (q v). The shaft of the humerus is nearly cylindrical in its upper part, but triangularly prismatic below, becoming flattened and broad at the lower extremity, where are placed the two condyles, with their articular surfaces, and the trochlea between them, which form, with the two bones of the forearm, the elbow joint. (See **ARM**, **SKELETON**.) The broad, flat lower extremity has two depressions on the anterior aspect of the bone—one slight one on the outer side called the radial depression, which is for the reception of the anterior border of the head of the radius, when the arm is strongly flexed, the other, called the coronoid depression, for the reception of the coronoid process of the ulna during flexion of the arm. Opposite the latter depression, on the posterior surface of the bone, is a deep triangular depression, called the olecranon fossa, for the reception of the olecranon process of the ulna when the forearm is extended. The humerus forms with the scapula, as above mentioned, a ball-and-socket joint, the

shoulder joint (q v). The elbow joint is a hinge joint and to a certain extent, in its relation to the head of the radius, a ball-and-socket joint.

HUMFREY, HUMPHREY, or HUMPHREYS, PELHAM (1647-74). A famous English musician and one of the founders of modern English music. He was born in London. He was one of the children of the Chapel Royal and while yet a boy composed considerable Church music, and in a book of *Divine Services and Anthems*, published by Clifford in 1664, there are five anthems ascribed to him. Upon the breaking of his voice he was sent by Charles II to France for instruction under Lully. Upon his return, in 1667, he was appointed to the Chapel Royal, he became master of the children in 1672 and composer in ordinary for the violins to his Majesty in 1673, and wrote many pieces for the King's band, an organization modeled after "Les Petits Violons" of Louis XIV. His compositions are still in use (many of them still in manuscript) in all the cathedrals and churches of England and America. They are remarkable for their expression and depth of sentiment as well as for bold innovations in harmony. He died at Windsor and was buried in the cloisters of Westminster Abbey near the southeast door.

HUMIDITY (from Lat *humiditas*, moisture, from *humidus*, *umidus*, moist, from *humere*, *umere*, to be moist, connected ultimately with Gk *ὕψος*, *hygros*, Icel *volr*, moist), **ATMOSPHERIC**. The moisture or aqueous vapor in the atmosphere. This vapor is really an invisible gas and is the most important component of the atmosphere as to quantity next after nitrogen and oxygen. When this invisible vapor becomes visible, it is called dew, fog, mist, haze, cloud, rain, hail, snow, frostwork, or frost; according to the size of the drops of water or the method in which the vapor condenses. Water and ice are not included under the term "atmospheric humidity," that term being strictly confined to the invisible vapor.

The aqueous vapor in the air is perpetually falling to the earth as rain or snow and is renewed by evaporation from the ocean, the lakes and rivers, vegetation, and the soil itself. The quantity of aqueous vapor in a cubic foot of air varies greatly with temperature and locality on the earth's surface. Thus, in the air of Arizona and New Mexico there is oftentimes only from 3 to 10 per cent of the amount that could be held in case the air were saturated. The quantity that can be held in a saturated space varies greatly with the temperature, but does not depend upon the barometric pressure and is also quite independent of the presence of air in that same space, since the aqueous vapor and the dry air coexist side by side. The elastic pressure of the dry air and the elastic pressure of the aqueous vapor added together produce what is ordinarily called barometric or atmospheric pressure. The weight of the moisture and the weight of the dry air added together determine the density of a cubic foot of atmosphere at any time. When a cubic foot of space contains as much aqueous vapor as it can possibly hold at any given temperature, it is said to be saturated with moisture. Such vapor will then exert a certain maximum pressure, known as the saturation pressure, which is the maximum for that temperature. Any effort to compress such vapor will cause condensation, but the pressure will remain the same. The saturation pressure is higher the higher the temperature. The accompanying table gives saturation

pressures for a number of different temperatures and shows, moreover, that there may be as much in an extreme case as 20 grains of invisible aqueous vapor in a cubic foot if the space is saturated at the temperature of 100° F, and this vapor will exert an elastic pressure of about one pound to the square inch, such as would be counterbalanced by a column of mercury of about 19 inches of the barometer. If, now, dry air is added to this cubic foot of space until a pressure of 30 inches is exerted in all directions, then the weight of the dry air at a temperature of 100° F will be 465 grains per cubic foot, and the combined weight of the vapor and the air, or the so-called saturated air, will be 485 grains. The accompanying table gives these relations for saturation at a pressure of 30 inches and for temperatures between 0 and 100, computed according to the data adopted in the Psychrometric Tables of Prof C F Marvin (United States Weather Bureau, 1900)

PRESSURE AND WEIGHT OF VAPOR AND AIR IN A CUBIC FOOT OF ATMOSPHERE AT A PRESSURE OF 30 INCHES WHEN SATURATED AT THE RESPECTIVE TEMPERATURES

TEMPERATURE	Vapor pressure	Dry air pressure	Vapor weight	Dry air weight	Total weight saturated air
Degrees Fahrenheit	Inches	Inches	Gr per cu ft	Gr per cu ft	Gr per cu ft
0	0.038	29.962	0.48	605.32	605.80
10	0.063	29.937	0.78	591.93	592.71
20	0.103	29.897	1.24	578.79	580.03
30	0.164	29.836	1.94	565.79	567.73
40	0.247	29.753	2.85	552.89	555.74
50	0.360	29.640	4.08	539.93	544.01
60	0.517	29.483	5.74	526.75	532.49
70	0.732	29.268	7.98	513.00	520.98
80	1.022	28.978	10.93	498.48	509.41
90	1.408	28.592	14.79	482.65	497.64
100	1.916	28.084	19.77	465.77	485.54

This table shows that the capacity of the unit volume of space or air for aqueous vapor increases very rapidly with rising temperature. When the space is not saturated, the atmosphere is said to have a relative humidity expressed as a given percentage of complete saturation. Thus, if the air has a temperature of 100° and contains only 10 grains of vapor per cubic foot, it contains only 50 per cent of the maximum amount possible at that temperature.

Water vapor at a given pressure and temperature weighs less than two-thirds as much as the same volume of pure dry air under the same conditions, hence air heavily charged with moisture is relatively lighter than dry air. The coefficient of expansion of unsaturated vapor is commonly assumed to be the same as for air.

The humidity of the atmosphere is usually determined by either the dew-point apparatus or the psychrometric apparatus. In the former the air is cooled down without altering the quantity of moisture that it contains, and the temperature at which that moisture saturates the air is determined. This dew-point temperature is always lower than the temperature of the free air. In the psychrometric method the temperature of a thin layer of water that is evaporating under standard conditions in the open atmosphere is determined. From this temperature of evaporation the psychrometric formula gives us the vapor tension, the temperature of the dew point, and the quantity of moisture in the air. In general the temperature of the dew point is about as far below the temperature of evaporation as the latter is below the temperature of the air.

The rate of evaporation from a moist surface diminishes with increasing humidity of the air, so that the total evaporation under a given wind in any given unit of time indicates the average dryness of the air during that time.

Nearly all animal and vegetable substances, by reason of their cellular structure, absorb moisture from moist air, but give it up to very dry air. They are, therefore, perpetually expanding and contracting, curling and uncurling, and their changes may be utilized in the construction of hygrometers. When moist air cools by radiation at night to temperatures below the dew point, the vapor is precipitated, forming cloud, mist, fog, or dew. On the other hand, when air rises, thereby coming under less pressure, it expands, does work, and is cooled dynamically by reason of the work done. Ordinary air cools at the rate of 1° F for 183 feet of ascent. In this way air that is forced over a mountain may be cooled below the dew point and form cloud or

rain. The moisture in ordinary dry air is easily absorbed by many substances, such as sugar, flour, salt, and in very moist weather objects may become so damp that fungus germs floating in the air and settling on them take root and cover them with mold or set up fermentation within them.

The humidity of the atmosphere, although invisible, has a special and strong influence in absorbing radiant energy, whether from the sun or from the earth. See *HYGROMETER*.

HUMILIATI (Lat nom pl, humbled). A monastic order which originated in the eleventh or twelfth century and was confirmed by Innocent III in 1201. In the sixteenth century it had 94 houses, with about 170 monks, in Italy, but, as it was corrupt, Carlo Borromeo (qv) tried to reform it. This attempt led to a murderous assault on him, so Pius V in 1571 suppressed the order. Several of their houses were turned over to the Barnabites—A female order of Benedictines, originating with the wives of the first Humiliati, known as humiliate nuns, or nuns of Blassoni, from their founder, Clara Blassoni, of Milan, served as nurses, etc. The order still exists in Italy, with five houses. Consult *Maximilian Heimbucher, Orden und Kongregationen* (Paderborn, 1908).

HUMITE GROUP. A group which includes the three minerals chondrodite, humite, and clinohumite, of which chondrodite and clinohumite are monoclinic and humite is orthorhombic. They are basic fluosilicates and are closely related chemically. A vitreous to resinous lustre is common to the group, and the general color is

red, brownish red, brown to yellow The humite group occurs mainly in ejected masses of limestone

HUMMEL, hum'mel, JOHANN NEPOMUK (1778-1837) A distinguished Austrian pianist and composer, born at Pressburg When but eight years of age, he accompanied his father to Vienna on the appointment of the latter as kapellmeister of Schikaneder's Theatre Here he came under the notice of Mozart, who became so interested in the boy that he admitted him to his own family and instructed him for two years His début in 1787 was also under the auspices of Mozart Next followed a number of very successful tours through Germany, Denmark, England, and Holland His entire career was marked by success and the appreciation of the public—so much so that at one time he was considered to rival Beethoven His principal appointments were as follows from 1804 to 1811, deputy kapellmeister under Haydn in the service of Prince Esterházy, 1811-16, a successful teacher of composition in Vienna, kapellmeister to the court of Stuttgart 1816-19, when he resigned to take a similar position at Weimar None of these appointments interfered with his concert activities. From about 1829 his health gradually failed, and after much suffering he died at Weimar As a pianist he ranked with the most famous of his generation, and as a composer he was in great vogue even for many years after his death His compositions number over 100, and include operas, cantatas, ballets, and considerable chamber music He is of importance in the history of music chiefly as the originator of the present method of fingering in pianoforte study.

HUMMELER (from *hummel*, variant of *humble*, *hamble*, to mutilate, from AS *hamelan*, OHG *hamalôn*, to maim, Ger *hammeln*, *hammeln*, to geld, from OHG *hamal*, *ham*, mutilated, possibly connected with Skt *śam*, to injure) An implement or machine used, especially in Scotland, for removing the awn from the grain of barley after it has been threshed It consists essentially of a vertical shaft set at different heights with blunt knives or beaters and revolving rapidly in a cylindrical case so as to beat the grain as it falls through the cylinder and thus detach the awns Some forms of the implement are operated by hand, while others are arranged as attachments to threshing machines

HUMMING BIRD (so called from the sound of its whirring wings) One of the diminutive birds of the order Coraciiformes and family Trochilidae, closely related to the swifts More than 600 species are known, exclusively American and mainly confined to the tropics, though a few species are summer visitors to colder latitudes, as far even as 61° N. A few, also, of the tropical species inhabit elevated mountainous tracts, even to the confines of perpetual snow In the United States 18 species of humming birds are known, but only one of these is found east of the Mississippi and north of Florida All of the others belong to the Southwestern States and the Pacific coast (see below).

Characteristics The brilliancy of humming birds, the rapidity with which they dart through the air, then hovering above the flowers from which they obtain their food, with a humming sound of wings which move so quickly as to be indistinctly visible or "like a mist," have attracted universal admiration The diminutive size of almost all of them—some are the smallest of birds and when stripped of their feathers not

larger than a bumblebee—has still further contributed to render them objects of interest Like the bumblebees too, they perform a service in the cross-fertilization of flowers Consult Belt, *Naturalist in Nicaragua* (London, 1888)

The largest-known species is *Patagona gigas* of the Andes, which reaches a length of 8½ inches, but this is really gigantic, few species exceeding 6 inches The smallest-known species is *Calypte helena*, which is only 2¼ inches long, it is a native of Cuba

The plumage of the different species exhibits an almost endless variety of form as well as of color, in crests, neck tufts, leg tufts, and many an extraordinary development of tail The plumage of the males is usually far more varied and glittering than that of the females, and to the believers in the theory this group of birds furnishes an extensive and forcible example in support of the doctrine of sexual selection (qv) Much of the metallic brilliance of the plumage, which in the gorgets and elsewhere often exhibits a gemlike conuscation and iridescence, is due to the interference of light by the minute scales upon the surface of each feather and not to pigments The young resemble their mothers until they reach maturity

Food, etc Humming birds have slender bills, which are also generally long, and in some extremely so, the form of the bill exhibiting adaptation to the kind of flowers from which the bird obtains its food—straight in some, curved in others The bill of the swordbill (*Docomastes ensifer*) is 5 inches long, much longer than the head, body, and tail of the bird together, while in *Rhamphocelus mucronynchus* the bill is only ¼ of an inch long In the sickle-billed humming birds (see HERMIT HUMMING BIRD) the bill is notably curved so as to form almost one-third of a circle, while in *Arcoactula* it is sharply and abruptly recurved at the tip Humming birds do not, as was long supposed, feed on honey alone, but to a considerable extent, and many of them chiefly, on insects, not excepting spiders, while they often snatch away the insects which have become entangled in spiders' webs The lower mandible fits into the upper, and the bill is thus adapted as a tube for sucking, in which, as well as in seizing small insects within the recesses of flowers, the tongue is also a very efficient organ The tongue is very long, capable of being darted out to a considerable length, the bone of the tongue is much elongated, and its branches pass round the back of the skull to the forehead, where they meet in a point before the line of the eyes The tongue itself consists of two filaments, joined together for the greater part of their length and separated at the tip The wings of humming birds are very long and powerful, the first quill feather the longest, and the rest shorter in succession

Nests, etc These diminutive birds construct exquisite nests of shreds of bark, soft grass, or cottony substances They are placed in a great variety of situations, from a mere saddling upon a branch to an attachment to the tip of a pendent and swaying leaf or tendril, and often the exterior is made almost invisible by having a coating of lichens or something else allying it closely to its background The eggs are invariably two in number, and they are always plain white The tiny owners are very bold in defense of their nests and young and are said to strike fearlessly with their needle-like bills at the eyes of birds of prey, which they far surpass in agil-

HUMMING - BIRDS



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1 RUBY THROATED HUMMING-BIRD
ARCHILOCHUS COLUBRIS

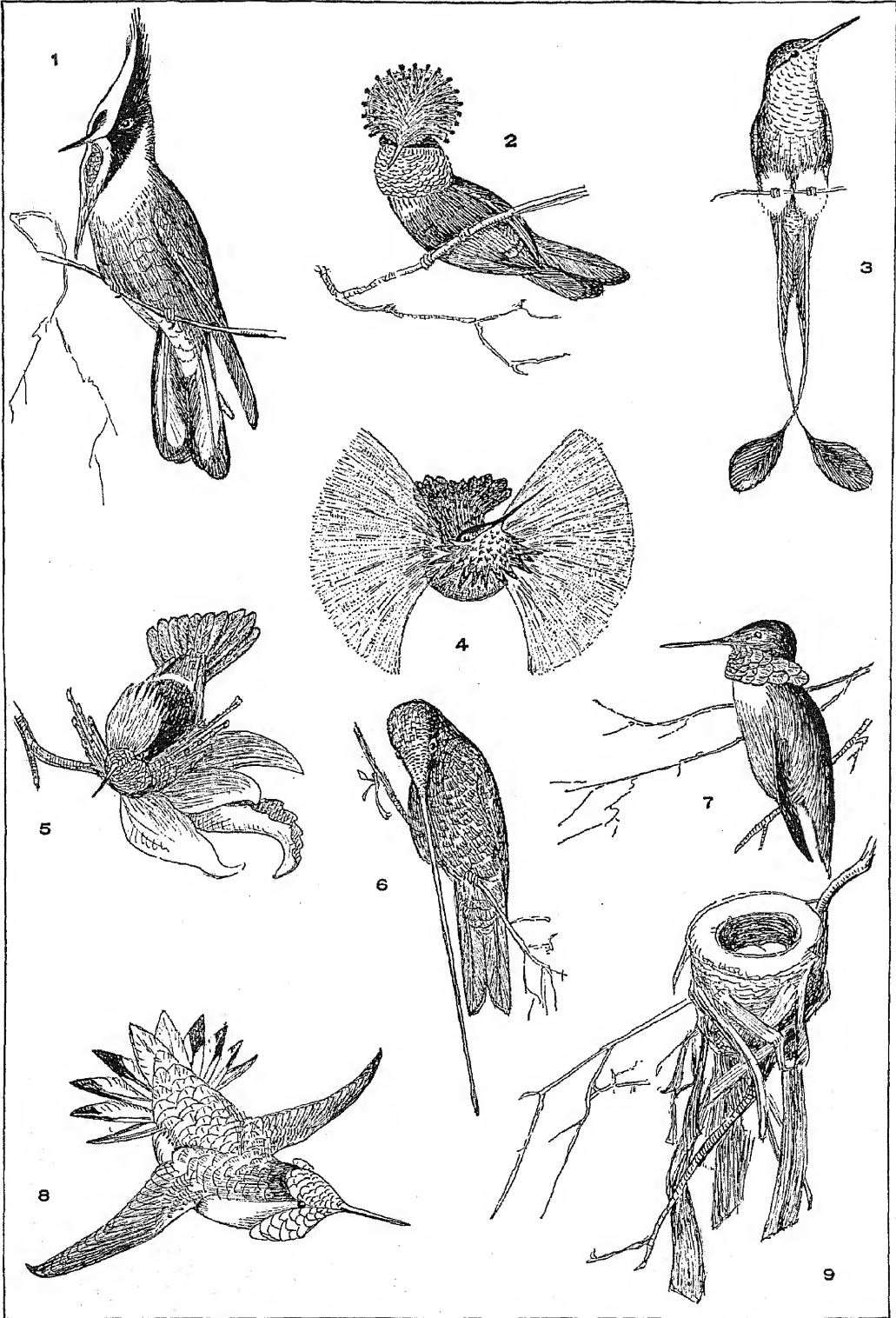
2 CALLIOPE HUMMING-BIRD - STELLULA CALLIOPE

3 GOLDEN HUMMER - HELIOTHRIX AURITUS

4 LONG-TAILED HUMMING-BIRD
AITHURUS POLYTUMUS

NATURAL SIZE

HUMMING BIRDS



1. HELMET-CREST (*Oxygogon guerini*).
2. SPANGLED COQUETTE (*Lophornis reginae*).
3. RACKET-TAIL (*Steganura underwoodi*).
4. CALLIOPE HUMMER (*Stellula calliope*).

5. TUFTED COQUETTE (*Lophornis ornatus*).
6. SWORDBILL (*Docimastes ensiferus*).
7. RUFOUS HUMMER (*Selasphorus rufus*).
8. FLORESIS HUMMER (*Selasphorus floresii*).
9. NEST OF RED-THROATED SAPPHIRE (*Hylocharis sapphirina*).

ity and rapidity of flight. They are very easily, however, imbued with confidence in a person with whom they are familiar and have been known to return again in spring, after a winter migration to a warmer climate, to the window from which they had been allowed to escape. Attempts to keep them in confinement have generally failed, and few have ever been carried alive across the Atlantic. Most of the hummers have no song, their only notes being queulous squeaks of wrath or fear. A few of the tropical forms, nevertheless, are said to be slightly musical. The skins of humming birds were employed for ornamental purposes by the more civilized American races before the discovery of America by Europeans, and were used by the Mexicans for making the pictures which excited the admiration of their Spanish conquerors.

Examples. The helmet crests (*Oxygogon*) are Andean and owe their name to their high-pointed head ornaments. The coquettes (*Lophornis*) are small, much ornamented hummers of the Amazon region and are easily recognized by their fanlike crests and by the spangled frills on each side of the neck. They are numerous and well scattered in South America, where one of the most beautiful is the "tufted" coquette of the island of Trinidad and the adjacent mainland. The racket-tailed hummer (*Steganura*), whose home is a limited region near the head of the Amazon, is among the smallest and most extraordinary of these birds, and is described as crossing, recrossing, and "snapping" in a marvelous way its long tail feathers in the air, as it darts about, especially when a rival male is near. The long-tailed species of the genus *Aithya* are West Indian; the one figured is a denizen of Jamaica.

Rubythroat, etc. Of the several humming birds of the United States, the ruby-throated (*Trochilus*, or *Archilochus, colubris*) is most widespread and familiar. It extends far to the north in summer and may be found breeding from Florida to Hudson Bay. In winter it retires to subtropical regions and is found from southern Florida to Central America. It is less than 4 inches long, and the principal color is bright shining green. The throat of the male is a beautiful metallic ruby red. This exquisite bird arrives in the northern United States early in May, with the opening of the cherry blossoms, and goes south late in August or early in September. In the Rocky Mountain region of the United States the rubythroat is replaced by the broad-tailed hummer (*Selasphorus platycercus*), a somewhat larger bronze-green bird with rose-purple throat. On the Pacific coast the common hummer is the Nootka Sound, or rufous, humming bird (*Selasphorus rufus*), about the size of the rubythroat, but deep rufous above, with the throat brilliant scarlet. It is notable for its occurrence as far north as Nootka Sound, Alaska, but it winters in Mexico. The commonest species in California, where it is resident through the year, is Anna's humming bird (*Calypte anna*), a trifle smaller than the rubythroat and of more exquisite coloration. The male is bronze-green above, with the whole head and throat brilliant purplish or rose red.

Bibliography. The literature devoted to humming birds is very extensive, including several hundred titles, but the most important works are John Gould, *Monograph of the Trochilidae* (London, 1861), and D. G. Elliot, *Synopsis and Classification of the Trochilidae* (Washing-

ton, 1879), while to the American reader Robert Ridgway, "The Humming Birds," in *Annual Report of the Smithsonian Institution for 1890* (Washington, 1892), is by far the best popular work. See HELMET CREST, HERMIT HUMMING BIRD, HILL STAR, SUNBIRD.

HUMMING-BIRD MOTH. See Colored Plate of MOTHS, AMERICAN.

HUMMOCK. See the first HAMMOCK.

HUMOR, AQUEOUS. See AQUEOUS HUMOR.

HUMORESKE, hu'mō-rēs'ke (Ger., Dan., from *humor*, Lat. *humor*, humor, disposition, from *humere*, to be moist). Originally a short, humorous tale or sketch, but applied by Schumann to short compositions for the pianoforte in a rather free form and distinguished by originality in harmonic and rhythmic combinations rather than by any really humorous elements. Heller, Grieg, and Dvořák have adopted the title for similar compositions of their own.

HUMORS. See HIPPOCRATES, MEDICINE.

HUMPBACK. A roqual (family Balenopteridae), or whalebone whale, of the genus *Megaptera*, in which the dorsal fin forms a lump upon the back. It is found in all seas, often reaches a length of 50 feet and sometimes much more, is thick and ungainly, and yields 50 or more barrels of oil. The baleen is short and of poor quality. This whale (*Megaptera longimana*) is recognizable at a long distance by its lolling, irregular manner of swimming, and at the mating season pairs indulge in antics highly amusing because of their size and uncouthness. They strike each other with their long flippers, and these love-pat caresses may be heard miles away. It is believed that in these performances originated the stories current about the attack on the whale by the thresher shark, which, as a matter of fact, could not injure such an opponent. See ROQUAL, WHALE, and Plate of WHALES.

HUMPBACKED SALMON. One of the smallest and poorest of the Pacific salmon (*Oncorhynchus gorbuscha*). It weighs only three to six pounds and is distinguishable by the small size of the scales and by the oblong coarse markings on the tail. It is occasionally seen in California and in the Columbia River, but is common from Puget Sound northward, where it is the dog salmon, or gorbuscha, of Alaska, also called haddo and hay-ko by the Indians, who smoke-dry it and use it as winter food. See SALMON, and Plate of SALMON.

The term "humpbacked" is applied to other fishes having an elevated dorsal outline, especially an Alaskan whitefish (*Coregonus nelsoni*).

HUMPED CATTLE, or ZEBU. The common domestic cattle of India and the East, known in books as zebu, or zubi, but not so called anywhere in the Orient. It seems to be a distinct species (*Bos indicus*), of which no wild examples remain. Certain bands of these cattle running wild have, however, ranged the forests of eastern India for hundreds of years and are large, long-horned, and shy. In addition to the enormous hump on the fore shoulders, these cattle show some convexity of the forehead, concavity of the upper border of the short horns, large drooping ears, and a very large dewlap. In size and color they vary considerably. The most common colors are ashy gray or creamy buff, but red, brown, black, and even white ones are seen. A certain number of white bulls are held sacred by the Hindus, whence the name Brahminy, often given to the entire race, and these wander about, dev-

astating crops and feeding upon the vegetables exposed for sale in the bazars without serious interference. The humped cattle are diffused over India, China, the Asiatic islands, Madagascar, and the east coast of Africa. There are many breeds, differing much in size, the largest are greater than any oxen of Europe, while the smallest are not much bigger than a large mastiff. The hump of the largest breeds is said to be sometimes 50 pounds in weight. English residents in India esteem the hump as delicious for the table. There are hornless breeds, and a breed with two fatty humps, one behind the other, is common in the vicinity of Surat. The voice resembles the grunting of the yak almost as nearly as the lowing of the ox. The zebu is used in India both as a beast of draft and of burden, is yoked in the plow, is occasionally used for riding, can travel from 20 to 30 miles a day, and is very gentle and docile. In recent years they have been introduced into Jamaica and some of the Central American republics in considerable numbers and are used on the large banana estates.

Galla Ox, or Sunga. A breed of humped cattle domesticated in East Africa, and most common in Abyssinia, remarkable for its massive horns, which sometimes form the figure of an upright lyre above its head. A sunga's horn may be 46 inches long and 15 inches around the base. This variety was known in ancient Egypt and has been regarded as the parent stock of the Indian breeds of humped cattle while Blyth finds in it an affinity to the banteng. Consult *Proceedings of the Zoological Society of London* (London, 1898), and Richard Lydekker, *Wild Oxen, Sheep, and Goats* (ib., 1898).

HUMPERDINCK, hum'pär-dipk, ENGELBERT (1854-) A German composer, born in Siegburg, near Bonn. He was studying to become an architect at Cologne, when he came under the influence of Hillel (qv) and was persuaded to devote himself to music. From 1874 to 1876 he studied at the Cologne Conservatory and from 1876 to 1879 at the Musikschule in Munich. Having won the Mendelssohn prize, he spent the next two years in Italy, where he met Wagner, who became greatly interested in him. For the last two years of the master's life Humperdinck was practically a member of his family, assisting in the preparation of *Parsifal*. Later he also became the teacher of Wagner's son Siegfried. After Wagner's death he went again to Italy and then to Spain, where he taught composition at the Conservatory of Barcelona (1885-86). After his return he lived for some years in Cologne and in 1890 accepted a position in the Hoch Conservatory in Frankfurt. In 1900 he was called to Berlin as director of the Meisterschule. His fame as a composer dates from the phenomenal success of his fairy opera *Hansel und Gretel* (1893), built almost entirely upon familiar folk tunes. In 1905 he visited the United States upon the invitation of the management of the Metropolitan Opera House, which induced him to remodel the incidental music to a fairy drama, *Die Koenigskinder*, written in 1896, into an opera. It was produced for the first time at the Metropolitan Opera House in 1910 and almost equaled the success of *Hansel und Gretel*, but was received with much less enthusiasm in Germany. Humperdinck has little inventive power, but covers this deficiency by resorting to folk themes, which he treats in truly masterly style. His exquisite harmonization and

orchestration also are important factors contributing to his well-deserved success. His other operas, none of which rise to the heights of either of the two mentioned, are *Die sieben Geiseln* (1897), *Donnoschen* (1902), *Die Heirat unter Willen* (1905), *Die Marktentendein* (1914). He also wrote incidental music to several fairy plays, to Aristophanes' *Lysistrata*, Shakespeare's *Tempest*, Maeterlinck's *Blue Bird*, and Vollmoeller's *Miracle* (staged by Reinhardt), two ballads for soli, chorus, and orchestra, *Das Gluck von Edenhall* and *Wallfahrt nach Keilnaar*, a *Moorish Rhapsody* for orchestra, and many smaller choruses for male and mixed voices.

HUMPHREY, DUKE OF GLOUCESTER, known as **THE GOOD DUKE** (1391-1447). The youngest son of Henry IV, he was Regent of England under Henry V and Protector previous to the coronation of Henry VI. He married Jacqueline, heiress of Holland and Hainault, and in 1424 overran Hainault, which was recovered by the Duke of Brabant. Later he married Eleanor Cobham, who was imprisoned for life for treason, and at the time of his death Humphrey himself was under similar charge. Consult K. H.ickers, *Humphrey, Duke of Gloucester* (London, 1907).

HUMPHREY, HEMAN (1779-1861). An American Congregational clergyman and educator. He was born at West Simsbury, Conn., graduated at Yale in 1805, and was pastor of the Congregational church in Fairfield, Conn., from 1807 to 1817, and of that in Pittsfield, Mass., from 1817 to 1823. He was president of Amherst College from 1823 to 1845, during the infancy of that institution. He was an early advocate of temperance, and a report of his on the subject made in 1813 is said to have been the first temperance tract. Among his publications there are, besides biographies, *The Sabbath* (1830), *Tour in France, Great Britain, and Belgium* (1838), and *Domestic Education* (1840). Consult W. S. Tyley, *History of Amherst College during 1821-71* (Springfield, 1873).

HUMPHREY, PELHAM. See HUMFREY, PELHAM.

HUMFREY CLINKER, THE EXPEDITION OF. A novel in the form of letters, by Tobias Smollett. The work was published in 1771 and founded partly on Anstey's *New Bath Guide* and partly on the author's own life.

HUMPHREYS, ALEXANDER CROMBIE (1851-) An American gas engineer and educator, born in Edinburgh, Scotland. Having come to the United States in 1859, he was a member of the staff of a New York insurance company (1866-72) and was afterward secretary and superintendent of a Greenville (N. J.) gaslight company. In 1877-81 he studied at Stevens Institute of Technology (Hoboken, N. J.), from 1881 to 1885 he was chief engineer of the Pintsch Lighting Company of New York, and in 1885 he was appointed superintendent of construction of a gas-improvement company, of which he became general superintendent and ultimately commercial manager, with headquarters at Philadelphia, Pa. From 1892 to 1908 he was senior member of the Humphreys and Glasgow Gas Company of London, a branch of which he established in New York in 1894 (reorganized in 1910 as Humphreys and Miller, Inc.). During his connection with these various enterprises he greatly furthered the manufacture of water gas. In 1902 he was elected president of Stevens In-

stitute In 1912 he served as president of the American Society of Mechanical Engineers He published *Lecture Notes on Some of the Business Features of Engineering Practice* (1905, 2d ed., rev and enlarged, 1912)

HUMPHREYS, ANDREW ATKINSON (1810-83) An American soldier He was born in Philadelphia, graduated at West Point in 1831, and was assigned to the artillery He resigned in September, 1836, and for the next two years was a civil engineer employed on government work under Major Hartman Bache In July, 1838, he reentered the army as first lieutenant and was assigned to the corps of topographical engineers. From 1842 to 1849 he was assistant in charge of the Coast Survey Office Later he was engaged in the surveys of the delta of the Mississippi and in those for various railroads Soon after the outbreak of the Civil War he became a member of the staff of General McClellan, with the rank of major, and in the Peninsula campaign was chief topographical engineer of the Army of the Potomac In April, 1862, he was promoted to be brigadier general of volunteers, and he was afterward in command of a division in the Fifth Corps of the Army of the Potomac, participating in the battles of Fredericksburg and Chancellorsville In the battle of Gettysburg he commanded the Second Division of the Third Corps, and as such had an active share in the second days fighting, earning promotion to a major-generalship in the volunteer service From July 8, 1863, to November, 1864, he was chief of staff to General Meade and subsequently commanded the Second Corps of the Army of the Potomac in Grant's final campaign against Lee He was brevetted major general in the regular army for services at Sailor's Creek, commanded the District of Pennsylvania for a time, and after being mustered out of the volunteer service was placed in command of the Engineer Corps with the regular rank of brigadier general He was retired from active service in 1879 He published *The Virginia Campaigns of 1864 and 1865* (1882), *From Gettysburg to the Rapidan* (1882), and, with H L Abbott, a *Report on the Physics and Hydraulics of the Mississippi River* (1861)

HUMPHREYS, DAVID (1752-1818). An American soldier, diplomat, and poet, born in Derby (now Ansonia), Conn., July 10, 1752, and educated at Yale College, where he graduated in 1771 He entered the army early in the Revolutionary War, was commissioned captain of the Sixth Connecticut on Jan 1, 1777, two or three months later became major of a brigade under General Parsons, was made aid to General Putnam in 1778, and in 1780 became Washington's aid and military secretary He conveyed to Congress the official reports of the surrender of Yorktown, was put in charge of the colors and standards captured from the British troops, was raised to the rank of lieutenant colonel, and for his services received from General Knox, in 1786, a sword voted by Congress five years before In 1784 he acted as secretary of the commission, consisting of Adams, Jefferson, Franklin, and others, that went to Paris to arrange commercial treaties between foreign powers and the United States He served in the Connecticut Legislature in 1786, participated in the suppression of Shays's Rebellion in 1787, and from 1788 to 1790 lived with Washington's family at Mount Vernon, where he wrote *An Essay upon the Life of Gen Israel Putnam* In 1789

he served on a commission appointed to treat with the Creek Indians From 1791 to 1796 he served as United States Minister in Lisbon, being the first diplomatic representative of the United States ever sent to Portugal, and was then made Minister Plenipotentiary to Spain In 1801 he returned, bringing with him the first merino sheep introduced into the United States In the War of 1812 he served as brigadier general of the Connecticut militia He was a fellow of the Royal Society of London and a prominent member of the literary coterie known as the Hartford Wits, with whom he wrote the *Anarchiad* His other writings include *The Widow of Malabar*, a translation of the French tragedy, *An Address to the Armies of the United States* (1782), *The Happiness of America*, *The Future Glory of the United States*, and many political papers and orations He died in New Haven, Feb 21, 1818

HUMPHREYS, JOSHUA (1751-1838) An American shipbuilder of Revolutionary times He was Welsh by descent, but was a native of Haverford, Pa In 1794, when Congress decided to build up the navy, the most capable shipbuilders in the country were consulted The designs of Humphreys were regarded as the best and were accepted The ships laid down upon his designs were the *Constitution*, *President*, and *United States* of 44 guns, and the *Chesapeake*, *Constellation*, and *Congress* of 38 guns These famous ships formed the nucleus of the navy which achieved such success in the War of 1812, and for this reason Humphreys was called by many people "the father of the American navy"

HUMPHREYS, MILTON WYLIE (1844-) A distinguished American classical scholar, born in Greenbrier Co, W Va He served in the Confederate army from 1862 to 1865, and from 1867 to 1875 he was associate and adjunct professor of the ancient languages at Washington and Lee University (A M, 1869) In 1872-74, while absent on leave, he studied at Berlin and Leipzig and received the degree of Ph D at the latter university in 1874 Having held the chair of Greek at Vanderbilt University from 1875 to 1883, he was professor of ancient languages at the University of Texas from 1883 to 1887, and in the latter year became professor of Greek at the University of Virginia, where he remained until his retirement in 1912 In 1882-83 he was president of the American Philological Association, and for a number of years he was American editor of the *Revue des Revues* His publications include excellent editions of *The Clouds* of Aristophanes (1885), the *Antigone* of Sophocles (1891), and the oration *On the Crown* of Demosthenes (1913) Besides his extraordinary mastery of Greek, Professor Humphreys had a wide knowledge of mathematics In classics he was noted in part for his skill in interpretation, in part for his mastery of ancient Greek metres, displayed both in the introduction to his edition of the *Antigone* and in papers entitled "On Certain Influences of Accent in Latin Iambic Trimeters," "On Elision, especially in Greek," "The Influence of Accent in Latin Dactylic Hexameters," "On the Nature of Cæsura," in the *Transactions of the American Philological Association* (1876, 1878, 1879) These papers, on important topics, are of the first rank for scholarship and insight

HUMPHREYS, WILLIAM JACKSON (1862-) An American physicist, born at Gap Mills, Monroe Co, W Va He was educated at

Washington and Lee University (A B, 1886, C E, 1888), at the University of Virginia (1888-89), and at Johns Hopkins University (Ph D, 1897). He taught physics and mathematics at the Miller School (Va.) in 1889-93, physics and chemistry at Washington College (Md.) in 1893-94, and physics at the University of Virginia from 1897 to 1905. He was professor of meteorological physics at the United States Weather Bureau after 1905 and also at George Washington University after 1911. He participated in the United States eclipse expeditions to Georgia in 1900 and to Sumatra in 1901 and directed the Mount Weather Observatory in 1905-08. He is author of contributions on electric discharges, on flash spectra, on pressure effect on arc spectra, and on isothermal layers of the atmosphere.

HUMPHRYS, PELHAM See HUMFREY, PELHAM.

HUMPTULIP See SALISHAN STOCK.

HUMP YARD, RAILWAY. A hump yard is a set of railroad tracks so arranged as to facilitate separating trains or drafts of cars according to prearranged plans for distributing the cars in groups according to destinations, routes, or traffic requirements. The hump yard, as distinguished from a classification yard operated in some other way, has a track raised over a natural or constructed hump from 6 to 15 feet high, with a grade on either side of from 0.4 to 3 per cent. Cars are pushed by a locomotive to the summit of this hump, are uncoupled there, and run down from the hump by gravity. The first hump yard built in the United States was at Huff's Station, south of Greenbush, Va., and was built in 1892 by the Pennsylvania Railroad. A large modern hump yard may have four tracks over the hump, two in each direction, with a classification yard on either side of the hump. In a yard such as this there would be from 20 to 30 classification tracks on either side of the hump, and each track would have a capacity of from 40 to 50 cars. The classification tracks branch off from the track running from the hump, and the switches from the hump track to the classification track are in a modern yard controlled by compressed air from a central station.

HUMUS (Lat., ground). A generic term for the decomposed organic matter contained in soil. During decomposition of vegetable matter the carbon, nitrogen, oxygen, and hydrogen pass off in the form of water, carbon dioxide, ammonia, etc., or are carried down into the earth in solution, while the remainder of the constituents form compounds less easily removed, to which the name "humus" is properly applied. These compounds have been investigated chemically, but little is known as to their nature and relations, special names have been given to a few of them, as crenic acid, apocrenic acid, ulmic acid, and ulmin. They are of importance in relation to the fertility of the soil, increasing its power of absorbing and retaining water, lessening its tenacity, and causing more rapid absorption of heat from the sun's rays. They may also indirectly afford nutrition to plant life. See SOIL, COMPOST.

HUMUS PLANTS. Plants which grow naturally in humus soil. Ordinarily in nature, where large amounts of humus are found, there is a rich development of forest trees. Associated very intimately with the humus, however, are a number of plants which depend not only upon

the rich organic food found in the humus and in the shade furnished by the trees, but also upon the presence of fungi which permeate the humus. The significance of these fungi is discussed under the head MYCORRHIZA. Until recently the plants dependent upon humus have been called saprophytes, but inasmuch as more close investigation has shown that the dependence is very rarely directly upon the humus, but rather upon the fungi spoken of above, such plants are now referred to as symbiotic saprophytes. Among these are found not only plants destitute of chlorophyll, like the Indian pipe, but also a large number of green plants, even forest trees, such as beech and pine. Another group of humus plants is found in the soils of peat bogs having an acid reaction. Plants of very xerophytic character are peculiar to these soils, and members of the heath family (Ericaceae, qv) are particularly abundant (see Bog), the leatherleaf (*Chamaedaphne calyculata*), the cranberry, and some of the blueberries being among the best known. Attempts to cultivate the blueberry, until recently, have been quite unsuccessful, but a few good patches have been grown upon acid humus, thus opening a new field in horticulture and at the same time utilizing areas that were productive only after the acid, naturally in the soil, had been neutralized by heavy applications of lime. See FOREST, SAPROPHYTE.

HUN, HENRY (1854-) An American neurologist. He was born at Albany, N. Y., graduated in 1874 from Sheffield Scientific School (Yale), where he was an assistant in physics in 1874-75, and in 1879 graduated from Harvard Medical School. In 1885 he became professor of nervous diseases at the Albany Medical College (Union University). He served as secretary (1888-1909) and as president (1910) of the Association of American Physicians and as president of the American Neurological Association for the year 1913-14. His writings include *Guide for American Medical Students in Europe* (1883) and *Differential Diagnosis of the Diseases of the Nervous System* (1913).

HUNAN, hōo'nan' (Chin., south of the lake, i.e., the Tung-ting Lake). An inland province of China, bounded on the east by the mountains of Kiangsi, on the south and southwest by the Nan-shan Mountains, which separate it from the provinces of Kwangtung and Kwangsi, on the west by Kweichow and Szechwan, and on the north by Hupeh (Map China, K 6). Area, 83,880 square miles. It is made up of the basins of four rivers, which discharge into the Tung-ting Lake and through it into the Yang-tse. The chief of these rivers are the Siang, which rises in the Nan-ling and flows north, receiving many tributary waters in its course, the Tsze, and the Yuen, which has its origin in the southeast of Kweichow, the latter furnishing the shortest and most satisfactory route to Kweichow, Yunnan, and Burma, being navigable by native boats as far as Chenyuanfu on the Kweichow frontier. The general slope of the province is towards the lake. Hills attaining in some places the height of mountains are found in the south, southeast, and along the Kweichow border on the west. The soil is fertile, and in many parts two crops a year are produced. The chief agricultural products are tea, rice, hemp, and tobacco. Hunan is one of the principal tea-producing regions of China, and immense quantities, over 300,000 piculs, are shipped every year to foreign countries from Hankow. The coarser varieties are

prepared in brick form and sent overland via Hankow to Siberia and Russia. Rafts of timber are floated annually down the Yuan River to Hankow, in value as high as 10,000,000 taels a year. Both bituminous and anthracite coal is found and mined. The anthracite is of good quality and is exported. Iron, copper, and tin are also found. Capital, Changsha (pop., 250,000). Changsha was opened to foreign trade in 1904. The population of Hunan is estimated at from 20,500,000 to 23,600,000. Hunan was for a long time a closed province to foreigners, and Changsha was noted for its antiforeign propaganda, but this hostile spirit has almost entirely disappeared. Changsha is noted at present for its learning, culture, wealth, and the independence and sturdiness of its people, the latter trait characteristic of the Hunanese in general. Other large cities are Changteh (pop., 150,000), the "treaty port" Yochow, opened in 1899 (pop., 20,000), and Siangtan (pop., about 350,000). The Changsha-Chuchow section, 33 miles in length, of the Canton-Hankow Railway was built entirely by the Chinese and has been in operation since September, 1911.

HUNCH'BACK', THE The most successful comedy of J. Sheridan Knowles, produced in 1832.

HUN'DRED (AS *hundred*, Ger. *hundert*, from AS, Goth. *hund*, OHG. *hunt*, Ger. *hund*, OIr. *cét*, Lith. *szimtas*, Lett. *simts*, OChurch Slav. *sūto*, Lat. *centum*, Gk. *ekátov*, *hekatón*, Skt. *śata*, hundred + AS *-red*, connected with OHG. *radān*, Ger. *Rede*, account, speech, Goth. *raþjō*, Lat. *ratio*, reckoning, *rerī*, to think). An ancient territorial unit in England, less than a shire or county, and usually greater than a parish or town. The origin of the name is involved in obscurity, but it is supposed to be derived from a convenient grouping of 100 families for purposes of defense or for local administration. Hundreds varied greatly in size in different parts of England, from 2 square miles in the southern counties to 300 square miles in Lancashire, but they maintained considerable uniformity within the limits of a given county. They were not mere subdivisions of the county, being both historically and for various administrative purposes independent of the greater territorial division within which they were included. See **WAPENTAKE**.

Each hundred had a court of ancient and forgotten origin, which was known as the *Hundred Court*. This was held at frequent intervals and appears to have been of equal authority with the county courts, though its jurisdiction seems to have been more restricted, being apparently confined to civil causes, such as actions of debt and trespass. Like the other customary courts of the feudal period, such as the county courts, courts baron, and the like, the hundred courts were composed of the freeholders of the hundred, who were liable to do service as "suitors," i.e., triers of suits, as one of the obligations of their freehold tenure. Most of these courts have been abolished and their jurisdiction transferred to the county courts, but a few, which were courts of record, have been permitted to survive.

But the hundred was more than a political and administrative unit, it was also a communal unit. It was liable in damages for a false judgment given by the hundred court. As early as the reign of Edgar it was provided that the hundred should be responsible for the administration of justice and liable to punishment by

fine or otherwise if thieves and other criminals were not brought to justice. The Statute of Winchester in 1285 (13 Edw. I, c. 2) made the hundred liable to respond in damages for robberies committed within its limits if the offender was allowed to escape punishment. At a still earlier period it was subject to the famous murder fine imposed by the laws of Canute upon any hundred in which any one not an Englishman was found slain. (See **ENGLISHERY**.) As lately as 1886 a hundred was held liable for damages resulting from rioting. Consult William Stubbs, *Constitutional History of England* (3 vols., Oxford, 1880), Pollock and Maitland, *History of English Law* (Boston, 1899), W. S. Holdsworth, *A History of English Law*, vols. i-iii (ib., 1908-09). See **CHILTERN HUNDREDS**.

HUNDRED DAYS, THE (Fr. *les cent jours*). The term of Napoleon's second reign as French Emperor. The period extended from March 20, 1815, the date of his entry into Paris, to June 28, when Louis XVIII. once more assumed power. At Elba Napoleon had been kept informed of the dissension prevailing among the allies at the Congress of Vienna and of the extreme unpopularity of the restored Bourbons in France. Seizing the opportunity, he left Elba, February 26, landed with 900 men near Cannes, and called upon the country to rise in his favor, March 1. The apathy of the Bourbons at Paris allowed Napoleon time to recruit his strength. When Louis at last bestirred himself, it was too late. The Napoleonic fever had spread, the soldiers of the Empire rallied around their old leader, and the troops sent out against him joined his standard. The final blow to the monarchy came when Ney, after great hesitation, went over to Napoleon, who entered Paris in triumph March 20, Louis having fled northward to Ghent. Napoleon immediately organized a government, issued writs for the election of an extraordinary assembly to draft a new constitution, abolished the existing Legislature, and began to raise troops. Meanwhile the allies at Vienna, on hearing of his landing, pledged themselves to hunt down the "bandit" and to put him out of power once for all. Eight hundred thousand men were sent out against him. At Paris there was a foreboding that this sudden restoration could not last, but though men had lost much of the fear and respect Napoleon had been wont to inspire, the work of organization nevertheless went on actively. On June 1, in the Champ de Mars, Napoleon solemnly swore to this new constitution, which was very liberal in character, and then set out with his army, for he had succeeded in raising 287,000 men, for the north. (See **LIGNY**, **QUATRE-BRAS**, **WATERLOO**.) Four days after Waterloo, June 22, he abdicated in favor of his son, attempted to escape to America, failed, gave himself up to the English, and ended his days at St. Helena. See **FRANCE**.

HUNDRED YEARS' WAR, THE The name of the long series of contests waged by the English kings, between 1337 and 1453, to gain the French crown and French territory. It was by no means an uninterrupted war, but rather a succession of battles, truces, and peaces. The first great period of the war extends from 1337 to 1380. Philip VI. (1328-50), of the house of Valois, had succeeded Charles IV., the last of the direct descendants of Hugh Capet, since, in accordance with the Salic Law (q.v.), the crown of France could be transmitted through the male line only, though Edward III. of England was

a nearer relation to the late King, his mother, Isabella, being a sister of Charles Edward's claim, however, was weak in this, that if females could transmit claims to the crown, then there were others who had even better claims than the English King. On June 6, 1330, and May 30, 1331, Edward by letters patent recognized Philip's claims, and, had the latter been a more capable man, war might not have resulted. The French King interfered in the affairs of the Flemish cities, with which England had intimate commercial relations. Moreover, Edward was influenced by the exiled Robert of Artois, who had been unable to obtain his inheritance from Philip VI. Edward declared war in 1337 and gradually made alliances with the Emperor Louis IV and John of Brittany, who was opposed by Charles of Blois, cousin of Philip VI, in his attempts to secure his inheritance. It is this war in Brittany which the great chronicler Froissart (qv) has especially described. On the other hand, Philip established that close alliance of France and Scotland which was to endure for centuries. There were many small skirmishes during the first years of the war, the most important of which was the naval battle of Sluys in 1340, but neither side gained decisive victories, and on Jan. 9, 1343, a truce was concluded for three years, each side retaining its possessions. Hostilities, however, were resumed in 1345. At this juncture the alliance of the Flemish cities was lost to England by the death of Jakob van Artevelde (qv), the leader of the Flemings, who perished in a popular tumult. On Aug. 26, 1346, the English, under the leadership of Edward himself, won their first great victory at Crécy (qv), which showed that the French knights could not stand against the well-disciplined yeoman archers of England. The victors took possession of Calais in 1347.

Meanwhile France was already experiencing the evils of war, the distress of the peasants was great, financial troubles set in, made worse by the tampering with the coin and the ever-increasing taxes. The second great defeat of the French took place at Poitiers (qv) in 1356, where the famous Black Prince led the English, and where King John, the successor of Philip VI, was taken prisoner. The States-General now for a time had control of the administration. Their leaders were Etienne Marcel, provost of the Merchants, Robert le Coq, Bishop of Laon, and Charles the Bad of Navarre, but the revolt of the peasants (see JACQUERE) in 1358 caused the more conservative classes to rally to the aid of the Dauphin Charles, who had been appointed regent by the States-General during King John's captivity. A brief breathing spell was brought about in 1360 by the Peace of Bretigny (qv). John died in 1364, and his son Charles V (qv), who was to be known as "the Wise," succeeded him. Himself an unwarlike man, he had the help of a great soldier in Du Guesclin (qv). His object was to regain the lands his father had lost, and by interfering with the possessions of the English in France and attacking them in Spain he forced a new war in 1369. Du Guesclin did not attempt to meet the English in the open, but harassed them and cut off their supplies, and the English experienced a succession of misfortunes. Moreover, in 1376 the Black Prince died, and there was no one capable of taking his place, a year later Edward III also died and was succeeded by Richard II, a minor. When, in 1380, Charles VI (qv) succeeded his father, few pos-

sessions remained to the English in France. In 1396 a truce for 28 years was signed, which ended the first period of the war.

In France meanwhile Charles VI had become insane, civil war broke out between the factions of the Armagnacs (see ARMAGNAC) and the Burgundians, and Paris itself was distressed by the rising of the Cabochiens (qv) in 1413. In England Richard II was overthrown by Henry IV in 1399, and the latter was succeeded in 1413 by his son Henry V. But the house of Lancaster did not feel secure on the throne, and nothing would turn the attention of the people away from internal affairs as completely as a foreign war. So in 1415 the war began again with the invasion of France by Henry V. France disunited offered an easy prey to the English, and soon the country was almost entirely in their possession, especially as they were aided by Philip, Duke of Burgundy (qv), who was eager to revenge the murder of his father, John the Fearless (qv). To the first year of this period belongs the battle of Agincourt (qv), fought on Oct. 25, 1415, the last of the three great English victories. On May 20, 1420, the Treaty of Troyes was signed, by which Henry V was recognized as Regent of France and the heir of Charles VI, while the Dauphin was disowned by his own mother. The English held practically the whole of France.

In 1422 both Henry V and Charles VI died, and the former was succeeded by his son, Henry VI, a child of 10 months, who was crowned Henry VI of France at Paris, his uncle Bedford being Regent. Charles VII, the successor of Charles VI, gave no signs of ability, and it seemed as if Henry VI would really hold France permanently. But when affairs looked darkest, France was saved by Joan of Arc (qv), who came forward and raised the siege of Orléans in 1429, thus turning the tide of war. From that time on the English slowly but surely lost ground, and when, in 1453, their last great captain, Talbot, fell at Castillon, the war ceased. Of all the extensive English conquests in France, nothing remained except the city of Calais and a small adjoining district. This France did not regain until 1558. Consult William Longman, *Edward III* (London, 1869), Henri Wallon, *Jeanne d'Arc* (Paris, 1875), Edouard Haury, *La guerre de cent ans* (ib, 1879), Lavis and Rambaud, *Histoire générale*, vol. III (ib, 1894), G. W. Kitchen, *History of France* (Oxford, 1896-1903), E. Deprez, *Les préliminaires de la guerre de cent ans* (Paris, 1902), J. Bouchier, *Chronicle of Froissart* (New York, 1903). See FRANCE, ENGLAND, BURGUNDY.

HUNEBOURG, un'boor', COMTE DE See CLARKE, H. J. G.

HUNEEUS, ōn'ā-ā'ōos, JORGE (1831-89) A Chilean statesman, born in Santiago. He was educated at the University of Santiago and after graduation taught mathematics in the institute. A fine speaker and a leader of the Liberal opposition, he was sent into exile by President Montt, but improved his time by studying the government and people of the United States. Recalled to his native land in 1861, he was elected to the House of Representatives and became its Speaker. He was made professor of administrative and constitutional law in the university the same year, professor of political economy in 1869, and rector in 1883. While lecturing at the university, he successively held the positions of secretary of the departments of Justice, Public Instruction, and Foreign Affairs, and senator from

the Province of Atacama. He published *Historia política de Chile* (1862), *La administración Montt* (1863), *Historia de la guerra con España* (1866), *Historia de la guerra del Pacífico* (1883). His most important work is *La Constitución ante el Congreso* (1879). Consult J. Huneus, *Obras* (4 vols., Santiago, 1890-91), edited by his sons and published by the government.

HUNEKER, hūn'k-ēr, JAMES GIBBONS (1860-) An American musical writer and critic, born in Philadelphia, Pa. He was a pupil of Alfredo Barilli, and of Ritter and Doutréau for theory, in Paris. On the completion of his studies in the latter city he returned to New York, where he took up his permanent residence (1885). He was musical editor, and in 1902 became dramatic editor, of the New York *Sun*. His numerous contributions to the leading magazines and reviews contain vigorous and consistent presentations of his musical ideals. Much of his later work is in the nature of essays. His writings include *Mezotints in Modern Music* (1899), *Chopin as Man and Musician* (1900), *Melomaniacs* (1902), *Overtures* (1904), *Iconoclasts* (1905), *Visionaries* (1905), *Egoists*, *A Book of Supermen* (1909), *Franz Liszt* (1911), *The Pathos of Distance* (1913).

HUNERIC. See HUNNERIC

HUNFALVY, hūn'fōl-vē, JÁNOS (1820-88) An Hungarian geographer and statistician. He was born in the County of Zips, Hungary, became professor of statistics in the Academy of Kesmark, took part in the political agitation preceding the revolution of 1848, and was professor of history in the polytechnic school at Buda (1866-70) and of geography in the University of Pest after 1870. He was elected a member of the Hungarian Academy in 1865 and died in Budapest. Hunfalvy wrote a *Universal History* (1850-51) and a *Universal Geography*. Of the latter only two volumes appeared during the author's lifetime, the third was published in Budapest in 1890. An excellent descriptive work on Hungary, entitled *A magyar birodalom természeti viszonyainak leírása*, appeared in 1863-66. He issued in German his *Ungarn und Siebenbürgen in Originalansichten* (1856), and in both German and Magyar his work on the *Travels of Ladislas Magyar* (1859).

HUNFALVY, PÁL, or PAUL (1810-91) An Hungarian philologist, ethnographer, and historian, brother of the preceding. He was born in the County of Zips, studied law at Pest, and from 1842 to 1848 was professor of law at Kesmark. Then he was elected to the Hungarian Diet, in which he sat until it was dissolved, when he went to Pest and in 1856 founded the philological review *Magyar Nyelvészeti*. Having been elected to the Hungarian Academy in 1859, he was for many years its librarian. He wrote *Chrestomathia Fennica* (1861), *Utazás a Balti-tenger vidékein*, travels in the Baltic country (1871, German, 1874), treatises on the dialects of the Voguls (1872) and the Ostiaks (1875), a Magyar ethnography (1876, German, by Schwicker, 1877), in Prochaska's series on the peoples of Austria-Hungary, a volume entitled *Die Ungarn oder Magyarer* (1881), *Die Rumänen und ihre Ansprüche* (1883), in which he contends that the place of origin of the Rumanian nation must be sought south of the Danube and a *Ruman nyelv*, a study of the Rumanian language (1878).

HUNGARIAN CONFESSION, THE A

confession of faith prepared by the Synod of Czengei and adopted by the Reformed church of Hungary, 1558. Its chief points were its emphatic rejection of the anti-Trinitarian views which had spread widely through Hungary, of the Roman Catholic and Lutheran doctrines of the Eucharist, and of Anabaptism. Upon the point of reprobation it is silent. The confession was superseded in 1567 by the Hungarian Synod's acceptance of the Second Helvetic Confession (1566). Consult Schaff, *Creeds of Christendom*, vol. 1 (New York, 1881), and Curtis, *History of Creeds and Confessions* (Edinburgh, 1911).

HUNGARIAN GRASS. See FOXTAIL GRASS

HUNGARIAN LANGUAGE. Called by those who speak it, Magyar, one of the Ural-Altaic group of languages, and both politically and literally the most important representative of the group. With the exception of the closely allied Finnish (including the various Finnic dialects spoken in Russia, as well as the Lapp) and Turkish, and the problematic Basque in the Pyrenees, it is to-day the only European language that does not belong to the Indo-Germanic group. The Ural-Altaic languages are divided into (1) the Finno-Ugric and (2) Samoyedic, forming the Ural branch, and (3) Turkic, (4) Mongolic, and (5) Tungusic, forming the Altaic branch. The linguistic position of Hungarian was for many years the subject of a heated controversy—one school, led by Vámbéry, claiming its close affiliation with Turkish, while the other, under Hunfalvy, placed it where it is now recognized as belonging, in the Finno-Ugric division.

Hungarian, like other Ural-Altaic tongues, is agglutinative in structure. It is built upon a basis of monosyllabic roots, through the addition of successive suffixes, which entail no inner change or structural modification in the original stem, but are merely set up in a row, one after another, like a row of bricks. The suffixes themselves, however, are modified in obedience to a law of so-called vowel harmony, which forms the most distinctive feature of this group of languages. The vowel sounds in Hungarian are divided into three classes: open vowels, *a, á, o, ó, u, ú*, close vowels, *e, ö, ő, ü, ü*, middle or neutral vowels, *é, i, í*. These neutrals may be used indifferently in words containing vowels of either of the other classes, but suffixes containing open or close vowels may stand only after a root containing a vowel of the same class, e.g., *házban*, 'in the house', *kertben*, 'in the garden', *várastandának*, 'they will be expected', *létezendek*, 'they will be entreated'. The pronunciation of the consonants is similar to that of Latin, excepting the sibilants and a few others which are peculiar to the language. Thus, Eng *s* is written *sz*, Eng *sh* is represented by *s*, Eng *ts* by *c* or *cz*, Eng *ch* by *cs*; Eng *j* by *ds*; and the sound of *z* found in *azure* by *zs*. Hungarian has no inflectional endings, in the strictest sense of the term. It has no grammatical gender, or even suffixes indicative of sex, *ő* means 'he' or 'she', *neki*, 'to him' or 'to her', and so on. In expressing case relations the bare stem is used regularly for the nominative and to some extent for the possessive, the other cases are represented by means of the various postpositive particles which in Hungarian take the place of prepositions, e.g., *ház*, 'house', *házban*, 'in the house', *házból*, 'out of the house', *házelőtt*, 'in front of the house', *házhoz*, 'towards the house', *házal*, 'with the house', *házat*, 'house' (accusa-

tive), *házalatt*, 'under the house', *házfellett*, 'above the house', etc. A noteworthy peculiarity is the system of possessive suffixes employed with substantives, closely analogous to the personal endings of the verbs e.g. *házam*, 'my house', *házad*, 'thy house', *háza*, 'his (her) house', *házunk*, 'our house', *házatok*, 'your house', *házuk*, 'their house'. In the absence of the auxiliary verb 'to have,' these possessive endings are used with the verb 'to be,' to denote ownership, *nekünk van házunk*, 'to us is house ours,' i.e. 'we have a house'. The verbal system in Hungarian is highly developed, giving the language a remarkable flexibility and a wide range of expression, though it offers to foreigners the chief difficulty in acquiring the language. There are two distinct forms of the active verb—a definite and an indefinite form, differing throughout in their terminations. Their respective uses are exceedingly idiomatic, but in general the distinction between them depends upon whether or not the object of the verb is a definite person or thing *látok*, 'I see', *a kutyát látom*, 'I see the dog'. Hungarian is especially rich in derivative verbs. Not only are there suffixes which, added to the simple verbal stem, form causative, frequentative, inceptive, intensive, diminutive, reciprocal, potential, and desiderative stems, but with the characteristic facility of agglutinative languages, two or more of these suffixes may be used in combination, resulting in such linguistic anomalies as reflexive-frequentative-potential, intransitive-diminutive-potential, and transitive-frequentative-causative-potential verbs. The following examples will give some idea of the formation of derivative verbs *látni*, 'to see', *látogatni*, 'to visit', *beszélnek*, 'they talk', *beszélgetnek*, 'they chatter', *beszélkednek*, 'they talk with each other', *ver*, 'he beats', *verintet*, 'he can beat gently'. Among the peculiarities of the language are the two-person suffix, *lak*, used in place of the regular ending of the first person, when the subject of the verb is 'I,' and the object 'thee' or 'you', the use of the singular number with ordinal numerals, e.g. *tíz ház*, 'ten house' (not 'houses'), and the inverted order of name and surname, e.g. Arany János = John Arany, Petőfi Sándor = Alexander Petőfi. The requirements of emphasis often allow the words in a short Hungarian sentence to be put in an order the reverse of that in English e.g. *Pénzemet elvett szolgádom*, 'money-my away-took servant-my' ('my servant took (away) my money'). The extent to which agglutination may be carried in the Hungarian language will be illustrated by the fact that it is possible to perform the following operation of word building *Magyar*, 'Hungarian', *Magyarázni*, 'to render into Hungarian,' hence 'to explain', 'to translate', *megmagyarázni*, 'to translate,' with the added notion of the accomplishment of the action, the syllable *meg* having the force of the German prefixes *be* and *er*, *megmagyarázhat*, 'he may translate', *megmagyarázhatatlan*, 'that cannot be translated', 'untranslatable'; *megmagyarázhatatlanabb*, 'more untranslatable', *legmegmagyarázhatatlanabb*, 'most untranslatable', plural subs *legmegmagyarázhatatlanabbak*, 'the most untranslatable', a *legmegmagyarázhatatlanabbakal*, 'with the most untranslatable'. A large number of names of common things in the Hungarian language are borrowed from the Slavic and German.

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Hungarian Academy of Sciences (6 vols, Budapest, 1862-74), Pál Hunfalvy, *Ethnographie von Ungarn* (German with additions by Schwicker, ib, 1877), id., *Die Ungarn oder Magyarern* (Vienna, 1881), Singer, *Grammar*, in English (London, 1882), Topler, *Grammar*, in German (Budapest, 1882), Pál Hunfalvy, *Vámbéry's Uspung der Magyarern* (Vienna, 1883), refuting Vámbéry's theory of a Turkish relation, Ferencz Bizonfy, *English-Hungarian Dictionary* (2 vols, Budapest, 1886), Mói Ballagi, *German-Magyar and Magyar-German Dictionary* (5th ed, ib, 1905), Zeigmond Simonyi, *Die ungarische Sprache, Geschichte und Charakteristik* (Strassburg, 1907), Meyer and Gombocz, *Zur Phonetik der ungarischen Sprache* (Upsala, 1909), Jovan Iskruljev, *Teorija direktné Metode i Preparacije za magjarski Jezik* (Sombor, 1911), Jozsef Szinnye, *Ungarische Sprachlehre* (Berlin, 1912), Vilmos Tolnai, *Ungarisches Lesebuch mit Glossar* (ib, 1913). See HUNGARY.

HUNGARIAN LITERATURE. Until modern times literature in the vernacular did not flourish to any very great extent in Hungary. Latin was the general medium of cultured expression during the Middle Ages, and even recently it has sometimes sought to supplant the popular tongue in official and literary use. There are, however, documents in Hungarian or Magyar that belong to the mediæval period, most of them being translations of legends and of books of the Bible. The earliest continuous monument of Magyar is a funeral ceremonial dating from about the beginning of the thirteenth century. From the middle of the fifteenth century until the second half of the sixteenth century there was some activity in the way of translating into Hungarian the lives and legends of the saints and the individual books of the Bible.

With the religious revolution ordinarily termed the Reformation there was inaugurated a more important era of literary production. Poetry was cultivated by Valkai, Tinódi, Rimai, Balassa, but no very great degree of originality marked the ensuing period, for from then until the closing years of the eighteenth century Magyar literature was chiefly one of imitation. Considerable attention, however, was shown to some of the more striking forms of literary art. Thus, during the sixteenth and seventeenth centuries lyric verse was cultivated, the drama was started by Karádi (1569), and much prominence was given in the seventeenth century to epic verse, by the poems of Zrínyi, Gyongyosi, László, and others. Before the commencement of the eighteenth century there also appeared many works of a polemical, legal, and philological nature.

During the eighteenth century an endeavor was made by the central authorities to subordinate Hungarian life and patriotic feelings to Germanic ideals. The attempt failed, but it resulted temporarily in an undue production of books in Latin and German, to the detriment of composition in Magyar.

Near the close of the century, and with the advent of the French Revolution, there was a reaction, and societies for the cultivation of the Magyar tongue were formed, and various periodicals (the first newspaper in Hungarian was started by Ráth at Pressburg in the eighth decade of the eighteenth century) founded in the same interest. The new movement, which coincided with the great national awakening in Hungary, bore rich fruit, and within the first quarter of the nineteenth century all foreign elements

gave way before it. The credit of this is largely due to Francis Kazinczy, the great linguistic reformer, and the poets Csokonai, Dajka, Verseghy, Alexander Kisfaludy, and Virág. The golden age of Hungarian literature was the 30 years preceding the revolution of 1848-49. Charles Kisfaludy, brother of Alexander, created the Hungarian drama by his tragedies and comedies, and his contemporary Katona won great fame as a writer of tragedy. Kolcsey, by his poems, ballads, prose writings, and orations, exerted a potent influence upon the patriotism of the nation. Fáy's fables and Cuczor's and Vorosmarty's popular epics also did much to evoke and foster a true national feeling. In the lyrics of Alexander Petőfi, one of the greatest and most original of modern poets, whose "Up Magyars!" became the war hymn of the revolution, and in the epic verses and ballads of Arany, Hungarian literature reached its culmination in the middle of the nineteenth century. Their contemporary, Bajza, was not only an eminent lyrical poet, but an historical writer and æsthetic critic. Jósika (a disciple of Scott's) and Eötvös, eminent in the field of fiction, exercised a large influence. In the domain of political literature and journalism Szechenyi, Kosuth, Eötvös, and Csengeri hold high rank. In the field of history Horváth, Jászay, and Szalay deserve mention. In 1848 the powerful national awakening culminating in revolution supplied a new inspiration. National consciousness prompted Tompa's *Folk-Tales* and *Folk-Sagas* (1846) and Erdélyi's *Hungarian Folk-Songs and Tales* (1846-48), with literary and æsthetic essays. Erdélyi's *Poems* (1844), lyric in the main, exercised a powerful influence over the famous trio, Petőfi, Arany, and Tompa. Arany (1817-82), the greatest ballad writer, surpassed him in formal perfection, and his greatest work also was a national epic, *Toldi*, in 12 cantos, celebrating the exploits of Toldi, the Hungarian Samson. Tompa (1819-68), unexcelled for sombre melancholy, struck the popular fancy with his *Poems* (1847). In drama Szilágyi (1814-78), with a wonderful mastery of dramatic development and situation, mostly based on intrigue, created a new genre with *The Deserter* (1843), which still holds the boards. His masterpiece, *Mamma* (1857), and other successful plays called forth a host of successors, with the results that the Viennese farces and vaudevilles were banished from the Hungarian stage.

However, the revolution of 1848-49 doomed many gifted writers to the dungeon, the scaffold, or exile. Lyric poetry was under the ban, the activity aroused sought new channels. Arany translated Shakespeare, Tasso, Goethe, Szász followed suit with masterly versions of Molière, Hugo, Dante, Shakespeare, Tennyson, Goethe, Schiller, and Heine. At this time the novel, with its opportunities for covert allusions, and the drama gained ascendancy. Jókai (1825-1904), novelist, poet, publicist, historian, and political champion, won his reputation, and Szász (1829-1906) proved his genius equally prominent in lyric poetry, fiction, and journalism. In 1860 the Austrian restraint was modified, and this gave a new impetus to literature. Tolnay's (1837-1902) *Ballads* (1861) were justly classed with Arany's, his *Lyric Poems* (1865) are strikingly original and tinged with melancholy, while the same brooding over life's problems characterizes his novels. Madách (1826-64) grappled with philosophical questions in *Man's Tragedy*,

his best work. Rákosi (1842-) produced in *Æsop* (1866) a comedy remarkable for poetic language and deft character drawing, while his keen drama, *Magdalen*, and the æsthetic study of tragedy are among the best contributions to Hungarian drama.

The constitution of 1867 marked a new epoch, the fight for nationalism being over, the Hungarians could look more soberly upon themselves, the wider horizons of cosmopolitanism having opened new vistas. In short stories, novels, and especially in his comedies, *The Good Patriots* (1872) and *New Men* (1873), Toldy (1844-79) gave splendid satires of contemporary life. Csiky (1842-91), the most fertile playwright, elicited applause with his *Proletarians*. Hungarian literature has its realistic writers, its psychological fiction, the short stories of Gyulai (1826-1909), who fosters the highest literary ideals in his *Poems* (1882), his critical studies and university lectures. Kornél Abrányi (1849-), in the character play *The Infallible Man* and the novels *Who is Stronger?* and *The Philosophy of the Husband*, devoted himself to a study of the problems of marriage. Mikszáth (1849-1910), probably the most popular novelist of the day, champions the peasants in North Hungarian village stories, matchless in their style, language, and sympathetic tone. Herczeg (1863-) shows an extraordinary power of psychological analysis in his portraits of the higher classes of Hungarian society. Finally Sigmund Bródy (1840-), a wonderful complex of unusual powers and nonchalance in workmanship, represents symbolism hand in hand with the most uncompromising realism.

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HUNGARIAN MILLET. See FOXTAIL GRASS

HUNGARIAN MUSIC See **MAGYAR MUSIC**
HUNGARIAN POLITICAL PARTIES
 See **POLITICAL PARTIES, Hungary**

HUNGARIAN VERSION See **BIBLE**
HUN'GARY, *oi*, officially, **THE LANDS OF THE HUNGARIAN CROWN** A kingdom of central Europe, constituting one of the units in the dual monarchy of Austria-Hungary. It occupies a compact area of 125,608 square miles, comprising Hungary proper, with Transylvania and the crownlands of Croatia and Slavonia and Fiume, which are united to Hungary, but have more or less independent administrations. The Lands of the Hungarian Crown are often designated as *Transleithania*, or the country beyond the *Leitha*, the Austrian half of the monarchy being called *Cisleithania*, or the country on this side of the *Leitha*, the *Leitha* being a small river which forms a part of the boundary between the two divisions. The Hungarian name of the country is *Magyarország* (pronounced *möd'yör-ör'sag*), the 'land of the Magyars' (Hungarians), the German name is *Ungarn*. The Kingdom of Hungary, exclusive of Croatia and Slavonia, has the form of an oval with its longest axis lying east and west along the parallel of 46° N. It is encompassed for two-thirds of its perimeter by the broad curve of the Carpathian Mountains, which, beginning at the Danube a short distance below the Austro-Hungarian capital, Vienna, extend northeast, then east, then southeast and south, and finally west, forming a great wall on the side of Moravia, Galicia, Bukovina, and Rumania. On the west Hungary proper borders on Lower Austria and Styria, and on the south, for a distance of about 100 miles, on Servia, from which it is separated by the Danube. Southwest of Hungary proper, and separated from it by the Drave and the Danube, is the dependent Kingdom of Croatia and Slavonia, a great part of whose boundary is formed by the Save, separating it from Bosnia and Servia. Croatia has a coast line on the Adriatic, and on an arm of this sea is Hungary's busy port of Fiume.

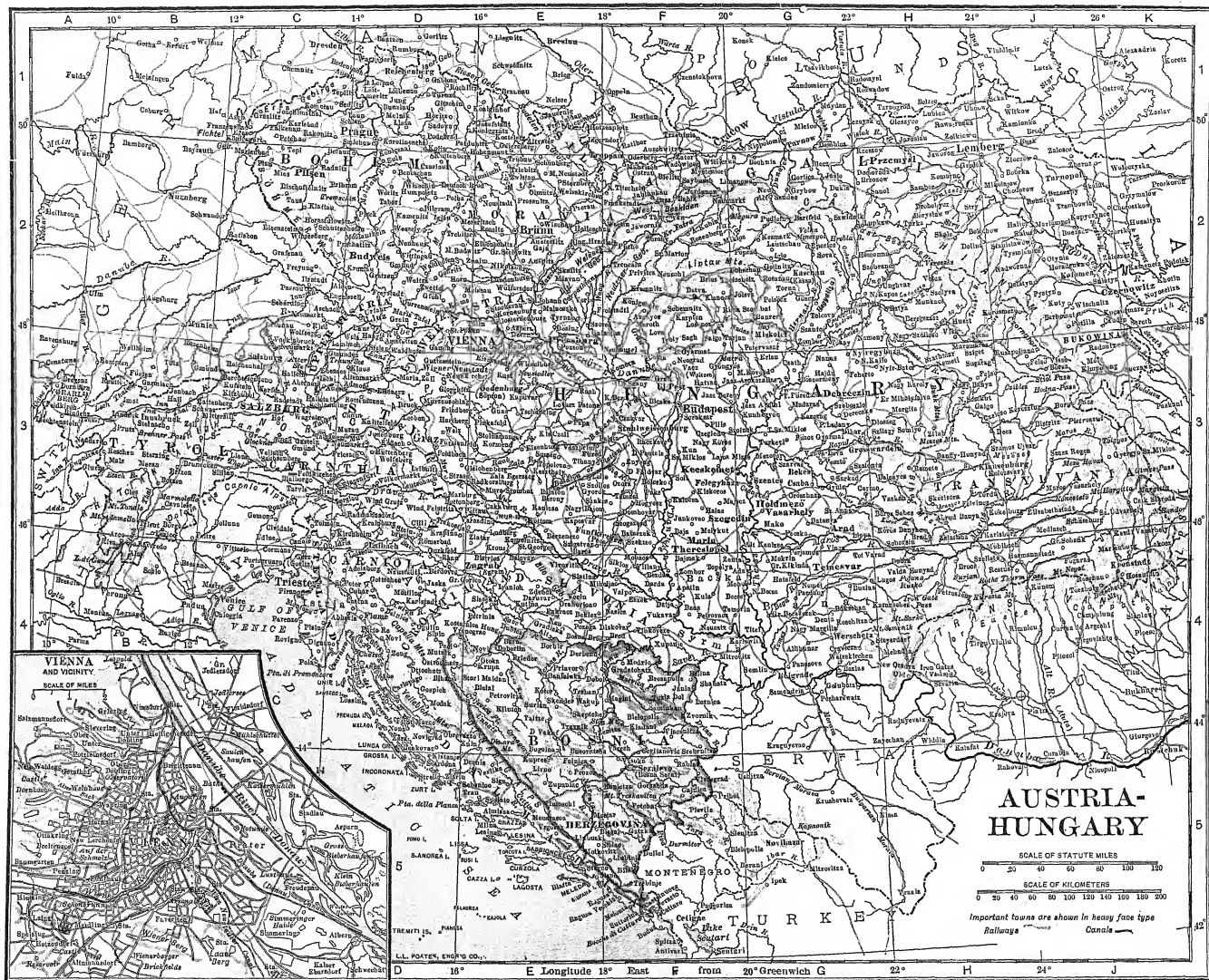
Topography The two great orographic features of Hungary are the Carpathians and the vast plains which they inclose in their broad sweep of about 800 miles. Croatia and Slavonia are traversed by the eastern offshoots of the Alps. The Carpathians spread out laterally in minor ranges, and a large portion of Transylvania, in the extreme east of the kingdom, is covered by them. The loftiest portions of the Carpathians are the High Tatra Range in the north and the Transylvanian Alps in the southeast, which rise in peaks over 8000 feet above sea level. The culminating point of the High Tatra is the *Gerlsdorferspitze*, 8737 feet. The Carpathians, rising above their densely wooded lower slopes, present an imposing aspect, with their naked granite peaks, on whose summits but little snow rests through the winter. The great stretch of monotonously level land in the central and southern parts of Hungary proper is divided into the Little Hungarian and the Great Hungarian plains. The Little Hungarian Plain (*Kis-Alfold*) in the northwest, with an area of about 5000 square miles and a mean elevation of 450 feet, lies upon the islands and both sides of the Danube from *Pozsony* to *Esztergom*. A portion of its surface is swampy, but for the most part it is exceedingly fertile. The Great Hungarian Plain (*Alfold*), which is the basis of Hungary's agricultural wealth and the principal seat of the

Magyar nationality, lies in the centre of the country between the Danube and the northeastern highlands. It covers an area of nearly 40,000 square miles and lies at an average elevation of 325 feet above sea level. Its surface has a very gradual slope from north to south. Low hills of loess and sand, with deep, swampy hollows, some impregnated with alkaline salts, lend the only appearance of relief. Trees rarely break the surface line except at villages, which are shaded generally by acacias. The soil, especially in the broad alluvial lands, is exceedingly fertile. In spite of its monotony, the *Alfold*, with its interminable expanse, its boundless fields and widespread villages, its great herds of cattle and droves of horses, and its picturesque types of peasants, herdsmen, and fishermen, is a region replete with interest for the traveler and with poetical charm for its inhabitants.

Hydrography The Danube receives the drainage of the entire country, except a small area in the north, which is drained into the *Vistula*. The course of the Danube from *Piessburg* to *Orsova* is nearly 600 miles, and the river is navigable throughout. The principal tributary from the north is the *Theiss* (*Tisza*), which traverses the Great Hungarian Plain, and the principal affluent of which is the *Maros*, from the west and south the Danube receives the *Drave* and the *Save*. In the Hungarian coat of arms four silver stripes represent the Danube, the *Tisza*, the *Drave*, and the *Save*. There are two large lakes in Hungary—the *Balaton* (*Platten See*), with an area of about 400 square miles (including submerged marshes), and the *Neusiedler See* or *Ferto*, 110 square miles, both lying in the western part, south of the Danube. In the Carpathians there are many beautiful little lakes of great depth, to which the Hungarians apply the name "*tengerszem*" (eye of the sea).

Climate Hungary has a continental climate and may be divided into two main climatic belts—the highland belt forming the north, east, and southeast portions, and the lowlands occupying the great central and southwestern parts. The winter, however, is severe throughout the country, and in the highland region the temperature sometimes falls as low as -18° F, while in the lowlands it seldom falls below 5° F. The summers are oppressively hot in the central lowlands, the *Alfold*, where the mercury rises to 95° F or even 105° F. The rainfall differs considerably between the highlands and the lowlands, the annual precipitation in the former being 47 inches and in the latter only half as much. The *Alfold* suffers frequently from prolonged droughts, but may at other times receive even excessive rains.

Geology and Mineral Resources Hungary stands in marked contrast to Austria in that by far the greater part of its surface consists of geologically recent formations. The Great Plain, watered by the Danube and the *Theiss*, presents an almost unbroken surface of Quaternary and recent alluvial deposits, while the great northern and eastern mountain systems show a preponderance of Tertiary rocks on their surface. The Croatian and Slavonian highlands are of Jurassic and Triassic formation, and here also are the chief outcroppings of the coal measures. Achaean diabases and granites occur in west and east Transylvania, and along the entire south slope of the Carpathian Mountains runs an extensive belt of volcanic rocks. The nuclear mass of the Carpathians is largely con-



structed of granite Hungary possesses a very considerable mineral wealth. There are great deposits of coal, iron, and salt, lead, copper, silver, and gold are found in various localities, the last mentioned chiefly along the rivers of Transylvania. Antimony, cobalt, nickel, mercury, and zinc also occur, and among the non-metallic minerals there are precious stones, kaolin, marble, and porphyry. The Hungarian opal, found in the trachyte beds near Vorosvágás, is particularly worthy of mention. It is only within recent times that the wealth of coal and iron has begun to be exploited on a large scale. The deposits of salt in the County of Mármaros, in the eastern Carpathians, which are worked by the state, are practically inexhaustible. There are hundreds of mineral springs scattered throughout Hungary. Among the most celebrated are those at Tatra-Fured (Schmeks), in the northern Carpathians, Mehádia (Baths of Hercules), near Orsova and the Iron Gate of the Danube, and Fured, on Lake Balaton, and Harkány, near Fünfkirchen (Pecs).

Agriculture, Live Stock, Forests, etc. Hungary is preeminently an agricultural country, 68 per cent of the total population being included in the agricultural class. The country made marked progress, both in the extent of the industry and in respect to agricultural methods, during the last three decades. A large majority of the cultivators of the soil are independent landowners. There are, however, a great many large estates belonging to the state and to members of the nobility, upon which the prevailing system of agriculture is very similar to that in vogue upon the large English estates. The average size of these 3977 large holdings is 4630 acres, or $7\frac{1}{4}$ square miles. The smallest holdings, numbering 1,459,893, average somewhat under $2\frac{1}{2}$ acres. The improvement in agriculture is largely indebted to the activity of agricultural societies. The natural conditions are generally favorable to the industry, the great fertility of the soil being especially a marked feature of the Hungarian plain. In some respects this plain is comparable to the Western prairies of the United States, but, like that region, it is subject to an uncertain rainfall, and it contains considerable stretches of sandy, arid land as well as marshy tracts, which have never been brought under cultivation. While the products of the country are characterized by their great variety, Hungary is best known for its production of wheat, live stock (including horses), and wine, the first two entering the European markets in competition with American products. The area devoted to wheat increased from a little less than 6,500,000 acres (on an average) during the period 1881 to 1885 to 9,153,688 acres in 1911, but decreased to 8,771,200 acres in 1913 and is now about equal to the combined acreage of rye, barley, and oats, which are about on a level with each other in importance. The increase in the area devoted to wheat was principally in the sandy and previously uncultivated tracts of central and south Hungary. Increased attention is also being given to corn, 7,189,219 acres having been devoted to its cultivation in 1911 and 7,212,404 acres in 1913. A large variety of root crops are grown, of which the potato leads in importance, followed by beets, much less than half of the latter crop being sugar beets. In 1913 nearly 450,000 acres were planted with sugar beets. The yield of the principal agricultural staples will be found in the table

under AUSTRIA-HUNGARY. Vine culture is extensively carried on in the hilly districts, the Hungarian wines being the most excellent known to the market. The most famous Hungarian wines are those that bear the name of Tokay. During the latter part of the nineteenth century the phylloxera devastated the Hungarian vineyards, and their area greatly decreased. From an average of 367,360 hectares (907,763 acres) in the period 1881 to 1885 it decreased to 245,405 hectares (606,407 acres) in 1895, but had increased again in 1911 to 357,867 hectares (884,305 acres). Hungary has an extraordinary wealth of temperate-zone fruits. The grapes are unsurpassed in flavor, and the plums and watermelons are of an excellent quality. Apples, pears, cherries, etc., are very extensively raised, and some semitropical fruits are cultivated in the south. Nuts are found in great variety. There is a considerable production of tobacco, but this is under the monopoly of the crown.

The Hungarian horse, though not large, is in great demand in the European market, because of its endurance and swiftness. The superiority of the breed is due to the care of the government, which selects and owns most of the stallions kept in the country. The fondness of the Hungarian for horses is well expressed in the saying, "The Magyar was created on a horse." The number of horses in 1911 was 2,351,481. In the same year there were 7,319,121 head of cattle, 8,548,204 sheep, 7,580,446 hogs, and 426,981 goats. As compared with the figures of the 1895 census, there was a decided increase in all varieties of live stock. In some sections buffaloes are used in considerable numbers in tillage. The Hungarian oxen are characterized by the extraordinary spread of their horns. The principal forest area is in the Carpathian Mountains and consists of forests of beech, oak, and pine. The numerous rivers of the country are rich in fish, and thus contribute an important item to the food supply of the people.

Manufactures. Since no duties can be collected upon the imports from Austria, the Hungarian manufacturing industries must compete with the long-established and highly developed industries of the sister monarchy, but in spite of this much progress has been recently made. The government has sought to encourage industries by favorable legislation, such as exemption from taxation. Most of the industries are being thoroughly modernized—concentrated under large plants, with highly improved machinery. Those which draw their supplies from the abundant agricultural products of the country—flour milling, brewing and distilling, sugar and tobacco manufactures, etc.—have taken first rank in importance. Iron products, clothing, and many less important items are also included among the manufactures. Many of the large establishments are centred in Budapest.

Transportation and Commerce. In respect to railway mileage Hungary will compare favorably with other European countries. Including Croatia and Slavonia, there were, in 1911, 13,041 miles of railway lines, 5048 miles of which were owned by the state, while 5902 miles of the remainder were operated by the state. Hungary has the distinction of having first applied the "zone-tariff" system to its railroads. The Danube and its tributaries afford extensive facilities for water transportation. The navigation of some of the rivers, notably the Theiss, has been greatly improved through the shortening of the course

by means of numerous cuts. In 1911 the country had 2176 miles of rivers and canals navigable by steamers. In 45 years (1867-1911, inclusive) the government expended more than \$60,000,000 on the maintenance and improvement of the waterways. The limited coast line tends to restrict the country's participation in the seagoing trade. The principal port, however, Fiume, is rapidly growing in importance, and a subvention is granted to Hungarian vessels registering in this port, the number of which has rapidly increased. About 70 per cent of the imports are from Austria, which takes about the same proportion of the exports. This arises from the fact that the two countries are mutually complementary in respect to their products, and that trade between them is free, whereas there is a tariff barrier to the trade with other countries. Grain, cattle, and other farm products pass from Hungary to Austria in return for manufactured products, principally textiles. Germany occupies a second place in the trade with Hungary. In 1913 the imports were valued at \$406,400,000 and the exports at \$375,500,000.

Government. The Emperor of Austria is King of Hungary. The foreign, military, and naval affairs of the Austro-Hungarian monarchy are conducted jointly by Austria (Cisleithania) and Hungary (Transleithania) through the medium of common ministries (including a ministry for the common finances) and the so-called delegations representing the separate halves of the monarchy. The Crownland of Croatia-Slavonia enjoys autonomy in local affairs, having its own Diet and its own ban or governor. It is, however, also represented in the Hungarian Diet. Since 1867 Transylvania has been an integral part of Hungary. In the national Hungarian Parliament the Magyar interests are predominant, and the Magyar language is official throughout Hungary proper, being obligatory in schools, etc. Croatia and Slavonia are allowed the official use of their native language. A full exposition of the government and the educational system, and a statement of finances, will be found in the article **AUSTRIA-HUNGARY**.

Defense. For army, see under **AUSTRIA-HUNGARY**, and for navy, under *Austria-Hungary* in article **NAVIES**.

Population. The population of the Lands of the Hungarian Crown in 1910 was 20,886,487, or 166 per square mile. This was somewhat more than two-fifths of the population of the Austro-Hungarian monarchy, exclusive of Bosnia and Herzegovina. There are a large number of racial elements represented in Hungary, and the bitterness of racial feeling is the occasion of much political and social friction. The Magyar-speaking population numbers 10,050,000, but this figure includes a large number of persons not of Magyar blood. The Rumanians (Wallachs), mostly in Transylvania, number 2,949,000, and the southern Slavs (Croats and Serbs) about 2,940,000. The northern Slavs number 2,441,000, about four-fifths of them being Slovaks, and the remainder mainly Ruthenians. Hungary has a German-speaking population of 2,037,000. The Germans constitute an important element in many of the cities, and in Transylvania there is a German-speaking district known as the "Saxon Land." There are over 932,000 inhabitants of Jewish blood, most of whom are included in the Magyar-speaking population. Next to Rumania, Hungary contains a larger number of gypsies than any other European country. They form a

picturesque element in the population, and their music is quite a feature in the charms of rural life in Hungary. There are a number of Armenians and Bulgarians in the kingdom. The population of Transylvania consists mostly of Rumanians, and the Magyar element is but feebly represented in Croatia and Slavonia. The Magyars are, as a rule, the landowners of the country. Hungary is unique among progressive European countries in the extent to which the different races still retain their own peculiar and long-established costumes. The costume of an Hungarian peasant is made of a linen shirt with long sleeves, reaching to the knee, a bodice ornamented with metal buttons or cords, wide linen trousers or tight-fitting ones, made of black or blue cloth, and stuck into leather boots ornamented with cords, a black round hat with feathers, or a black fur cap for headdress, and a cloak made of close, coarse cloth and trimmed with fur, cords, etc., or a wide sleeveless sheepskin coat, worn also to some extent in summer. The costume of the Hungarian peasant woman is also very picturesque and is made usually of lighter materials. The population is very largely centred in villages, some of which contain several thousand inhabitants, but there are a few large towns. Budapest in 1910 had a population of 880,371, showing a gain of 20 per cent in the last decade. Szegedin, with a population in 1910 of 118,328, is the only other town containing over 100,000 inhabitants. Cities having between this and 50,000 inhabitants in the order of size, are Szabadka (Maria-Theresiopol), Debreczin, Agram (Zágráb), the capital of Croatia and Slavonia, Pressburg (Pozsony), Temesvár, Keskemet, Grosswarden (Nagy-Várads), Arad, Hódmező-Vásárhely, Klausenburg (Kolozsvár), Ujpest, and Miskolcz. Other well-known towns are Kionstadt and Hermannstadt in Transylvania, Fiume, Kaschau, Oedenburg, Stuhlweissenburg, Raab, Eszék, and Gyan (Esztergom), the seat of the Roman Catholic Primate of Hungary. The population of the Kingdom of Hungary in 1910, according to religions, was as follows: Roman Catholics, 10,888,000, Orthodox Greeks, 2,987,000, Calvinists, 2,621,000, Lutherans, 1,340,000, United Greeks and Roman Catholic Armenians, 2,025,500, Israelites, 932,000; Unitarians, 74,300.

History. The Hungarians—or, as they call themselves, the Magyars—have been settled in their present abode somewhat more than 1000 years. They constitute a branch of the Finno-Ugric race (Ural-Altaic family), their nearest kin being the Finns (See **HUNGARIAN LANGUAGE**). They figure in the old writers as Ugri, Wengri, Ungri, Ungari, Hungari. They first entered the lands now known as Hungary under the leadership of the legendary Árpád, who by 906 is said to have conquered the Slavic inhabitants. The invaders were a barbarous horde, who for more than half a century were the terror of the nations to the west and the south. They broke up the Moravian realm, made incursions into Germany and Italy, everywhere pillaging, burning, and slaughtering, and awakening superstitious terrors in the minds of the inhabitants, and carrying their devastations far and wide. At last the German kings succeeded in putting an end to their onslaughts. They were defeated in 933 by Henry the Fowler on the Unstrut, and Otho the Great vanquished them on the Lech in 955. Forced to accommodate themselves to a settled existence, and in possession of a fruitful

domain, the Hungarians showed themselves amenable to the civilizing influences emanating from without, and among other things they developed a capacity for the adoption of political institutions based upon Western models. In 975 their ruler, Geyza, embraced Christianity, which had begun to take root in the nation. His son Stephen, the first King of Hungary, known as "the Saint," was crowned in the year 1000 (some years after he began his rule), with a crown sent him by Pope Sylvester II, who at the same time bestowed on him the title of "Apostolic Majesty." With St. Stephen, whose reign of over 40 years terminated in 1038, a new era began for Hungary. Christianity took the place of heathen superstitions, the royal authority was firmly established, new laws were made, and the people advanced rapidly in civilization. After Stephen's death there was a reaction, and his immediate successors had to contend against a pagan revival and a general tendency to disintegration. Ladislas I the Saint (1077-95), renowned for his wise legislation and for great personal valor, proved a worthy successor of Stephen, and under his rule Hungary again became a strong kingdom, with its boundaries increased by the acquisition of part of Croatia. Coloman (Kálmán) (1095-1114), known as "the Learned," was far in advance of his age, as many of his laws show. He gained possession of Dalmatia. Under King Geyza II (1141-61) German colonists settled in north Hungary and in Transylvania, in consequence of which mining and several branches of industry made rapid progress. Andrew II (1205-35) is known in connection with the Crusades. The Golden Bull, the Hungarian Magna Charta, was granted by him to his nobles in 1222. Béla IV (1235-70) showed great qualities in subduing the pride of the nobles and in healing the wounds of his people after the terrible invasion of the Mongols in 1241. Andrew III was the last male scion in the Árpád line, dying without issue in 1301.

The succeeding period of Hungarian history, terminating with the battle of Mohács in 1526, witnessed the culmination and decline of the independent monarchy. Louis I, called "the Great" (1342-82), was the second king of the house of Anjou, which obtained the throne in 1308, being by his great-grandmother connected with the Árpád dynasty. He reestablished the authority of law, which under his predecessors had been openly violated by the powerful nobles. He promoted science, industry, and commerce. He had long and difficult struggles against the Turks and against the buffer colonies of Hungary, such as Moldavia, Servia, Bosnia, etc. The latter either became practically independent or else paid tribute to the Turks. Sigismund (1387-1437), the son-in-law of Louis, succeeded him as King, but he is better known as Holy Roman Emperor. In the person of Sigismund's son-in-law, Albert V of Austria (1438-39), the Hapsburgs first came into possession of the Hungarian throne. After his death the country was for a few years under the rule of King Ladislas of Poland, who was overwhelmed and slain by the Turks at Varna in 1444. He was succeeded by Ladislas the Posthumous, the son of Albert of Hapsburg, under whom the government was administered by John Hunyadi, an heroic figure in the wars between Christendom and the Turks. Hunyadi's son, Matthias I, ascended the throne in 1458. Matthias I—better known as Matthias Corvinus—has been called not only the greatest

King of Hungary, but also the greatest sovereign of his age. By his military successes, sagacity, and love of learning he raised his nation to a high pitch of splendor. From the death of Matthias (1490) to the fatal day of Mohács Hungary exhibited the fiercest strife of factions—a protracted agony, preceding the loss of national independence. Among the many calamities during the reign of Ladislas of Bohemia (1490-1516), the peasant war occupies a prominent place. Dózsa (qv) and his insurgent bands, after having committed great havoc, were exterminated by the famous John Zápolya, or Szapolyai, Voivode of Transylvania. Louis II (1516-26), who was also King of Bohemia, was but 10 years old at the death of his father, Ladislas. The Turks, who had been making incursions into the kingdom since the early part of the fifteenth century, took advantage of the anarchy under the young Louis to attempt the conquest of Hungary. In 1521 they captured Belgrade, and on Aug. 29, 1526, an army of 100,000 men under Solymán the Magnificent crushed the forces of the Hungarians at Mohács, where the King and more than 20,000 of his men perished. The national party in Hungary chose John Zápolya, Voivode of Transylvania, to be Louis's successor, while a part of the nobles offered the royal crown to Ferdinand of Austria (brother of the Emperor Charles V), between whom and Louis a double marriage connection had existed. After a struggle between the rivals and fresh invasions by Solymán the Magnificent (who had given his support to John Zápolya), Hungary, after 1541, remained rent into three parts. The central part of the kingdom, with the capital, Buda, came into the immediate possession of the Turks.

The Austrian power for a long time was confined to the western part of the country. The religious policy of the Hapsburg emperors and the activity of the Jesuits excited the fierce opposition of the Protestants, which culminated in 1604 in a great rising, headed by Stephen Bocskay (qv), who in the Peace of Vienna, in 1606, forced the Emperor Rudolph II to grant religious freedom to his Protestant subjects in Hungary. At the beginning of the Thirty Years' War (1618-48) and towards its close, the princes of Transylvania were in arms for the Protestant cause against the Hapsburgs. Ferdinand III (1637-57) was compelled to concede a large measure of self-government and religious freedom to the Hungarians, but his successor, Leopold I, initiated a policy of repression which led to a formidable uprising under Tokolyi (1678), who summoned the Turks to his aid. In 1683 Vienna, the capital of the Hapsburgs, after a heroic defense, was on the point of falling into the hands of the Moslems, when the victory achieved before the city by John Sobieski and the German princes turned the tide of war, and the power of Turkey collapsed. Buda was recovered by the Christians in 1686. After sanguinary vengeance had been wreaked on the leaders of the rebellion Leopold I forced the Hungarians in 1687 to declare the crown of Hungary forever hereditary in the house of Hapsburg. The dominion of the Turks rapidly disappeared from Hungary, the Treaty of Karlowitz (1699) left only the Banat in their hands, and that, too, was acquired by the Treaty of Passarowitz (1718) as a result of the victories of Prince Eugene. The Treaty of Karlowitz also secured Transylvania to the Hapsburgs. In 1703 Francis Rákóczy excited the

Hungarians to rise in defense of their liberties against the Austrian house, and a struggle ensued which was not terminated until 1711, when Charles VI immediately after his accession found it necessary to come to terms with his Hungarian subjects. Charles VI succeeded in gaining the approval of the Hungarians for his Pragmatic Sanction by the grant of extensive privileges, and after the Emperor's death, when the onslaught of Frederick the Great, the Saxons, the Bavarians, and the French threatened the dismemberment of the Austrian realm (1741), the nation rallied to the support of the young Queen, Maria Theresa, who had appealed to the National Diet, assembled at Pressburg. During her reign Hungary enjoyed an era of progress and prosperity. The reforms of Joseph II, her son and successor (1780-90), were received with violent opposition, because of their attack on the local liberties of the people through the institution of a strongly centralized administration. Bitter dissatisfaction was also aroused by the Emperor's attempts to make German the official language of the country. In 1790 Joseph II saw himself driven to repeal his measures of reform, except those dealing with the abolition of serfdom and the establishment of freedom of worship. Under Leopold II (1790-92) the old constitution was restored, but his successor, Francis I (1792-1835), ruled in an arbitrary fashion and seldom troubled himself to assemble the Diet. In his reign a great political upheaval began to manifest itself in Hungary. The period after 1815 witnessed the rapid development of an intense national (Magyar) consciousness, which evinced itself in the demand for a strictly constitutional government and the enactment of widespread reforms. The strife of parties was carried from the legislative hall to the press, and the Liberals grew in strength as their support among the mass of the people increased. This great national and reform movement, which was headed by such men as Széchenyi, Batthyányi, Eötvös, Deák, and Kossuth, and which was accompanied by remarkable activity in the field of literature, constitutes a brilliant and stirring episode in the annals of Europe in the second quarter of the nineteenth century. Notable gains were the Law of 1843, which made men not of noble blood eligible for office, and the enactment of measures for making the Magyar tongue the official language of Hungary. The revolutionary movement of 1848, which, emanating from France, convulsed a great part of Europe, brought upon Hungary a sudden and terrible catastrophe. In March of that year, immediately after the downfall of Metternich, who had so long guided the reactionary policy of Austria, the Hungarians were accorded an independent ministry. Under its guidance the progress of Liberal reform continued. But the hostile attitude of the Austrian court towards the new order, and the encouragement which it gave to the Croats and Wallachs, who rose in revolt against the Magyar rule, resulted in an open war between the house of Hapsburg and Hungary, which under the lead of Kossuth declared its independence in April, 1849. After an heroic struggle (the details of which will be found in the article AUSTRIA-HUNGARY), Hungary succumbed to the combined forces of Austria and Russia and was deprived of its constitutional liberties and treated as a conquered country. Before many years, however, the Emperor Francis Joseph was forced to recognize the necessity of

some kind of reconciliation with his Hungarian subjects, and the blow sustained by Austria at the hands of Prussia in 1866 brought about the reerection of Hungary as a constitutional kingdom. The demands of the Hungarian people, as set forth by their great spokesman, Francis Deák, were acceded to in the Ausgleich of 1867, by which the present dualistic frame of the Austro-Hungarian monarchy was established. The settlement was sealed by the coronation of Francis Joseph as King of Hungary on June 8 1867, the ceremony taking place at Buda with extraordinary pomp. The revived Magyar people now set itself with ardor to the task of the strengthening of its nationality, the introduction of political and ecclesiastical reforms, the extension of public education, and the development of the economic resources of the country. The nation enthusiastically followed the lead of the great Francis Deák, who at his death, in 1876, had an able successor in Tisza. The patriotic zeal of the Magyars has at times transgressed the bounds of moderation, and the measures taken to extend the use of the Magyar tongue have excited fierce opposition, especially in Croatia. The economic progress of Hungary in the last three decades of the nineteenth century resulted in a more aggressive attitude towards Austria.

The expiration of the commercial Ausgleich in 1897 was followed by prolonged negotiations with Austria, but though a new alliance was formulated in 1902, it failed to receive the approval of the respective parliaments. The contributions of the two halves of the monarchy to the common expenditure were determined provisionally from year to year by the Emperor. In 1903 the opposition began a violent campaign for the complete nationalization of the Hungarian army. In the contest the powerful Liberal party was overthrown early in 1905, and as the Independent majority led by Francis Kossuth declined to take office, an extraparlimentary condition ensued. The crisis, which was regarded in Austria as arising from the real desire of the Hungarian majority to transform the monarchy into a personal union, was averted by compromise in 1906.

The problems of Hungary concern not only Austria, but the subject races, mainly Slavonic, who constitute more than half of the population of the Kingdom of Hungary. The ruling race of Magyars, who form the overwhelming majority of the electors, have done everything in their power to Magyarize the country, but so far their efforts have not been successful.

In 1906 the Coalition ministry came into power pledged to universal manhood suffrage, but it did nothing to carry out this pledge for fear of losing Magyar ascendancy. On the contrary, the subject Slavs were persecuted more than ever. As a result of great demonstrations in favor of electoral reform, in 1908, Count Andrassy introduced a franchise bill which, while extending the suffrage, was so drawn as to insure Magyar hegemony. The bill aroused so much opposition that it was dropped.

The relations between Austria and Hungary, always contentious, became acute over the demand of Hungary for a separate national bank. The ministry divided on this matter, Count Andrassy opposed it, but the extremely nationalist Independence party, led by Ferencz Kossuth, the son of the great revolutionist, strongly favored the scheme. Realizing the threat to the dual monarchy contained in the project, Austria declared its opposition to it and started an agita-

tion among the non-Magyar population. The conflict over the bank became serious, as the Hungarian Parliament refused to vote the estimates. A new cabinet was formed in 1910 under Count Klueen Hederváry, a Moderate, which immediately went to the country in the issue of universal suffrage and conciliatory relations with Austria. The ministry was returned by an overwhelming majority, and the bank matter was dropped.

Another question which came to trouble Austro-Hungarian relations was that of a separate Hungarian army. Kossuth and his Independence party had put this demand in the forefront of their programme and in 1912 compelled the resignation of the Hederváry ministry because it refused to endorse it. The Emperor-King Francis Joseph then threatened to abdicate if such a law were enacted, and for this reason the matter was dropped.

The unceasing agitation for universal suffrage among the lower classes and subject races of Hungary finally compelled the Premier, Ladislaus von Lukács, to introduce a franchise bill (Jan. 2, 1912). This measure to some extent was democratic, as its provisions would have resulted in doubling the electorate. But the special electoral privileges given to age, class, property, and education so disappointed the Radicals and Socialists that they organized great demonstrations against the bill and threatened to call a general strike. Scenes of violence were enacted in the Hungarian Parliament. Count Stephen Tisza, the conservative President of the Chamber, became the subject of violent abuse on the part of the Radicals. The cabinet was forced to resign, and Count Tisza became Prime Minister. A new opposition party committed to democratic franchise reform was then organized by Count Andrassy. The Great European War of 1914 brought Hungary enthusiastically to the side of Austria. The Magyars in Hungary fear the Slavic propaganda of Russia almost as much as Austria, as a Russian victory would endanger the loyalty of the subject Slavs in Hungary as well as in Austria. (see WAR IN EUROPE)

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HUNGARY, JACOB OF. See PASTORELS.

HUNG'ER. See DIGESTION, ORGANS OF.

HUNGERFORD, hūn'gēr-fērd, MRS. MARGARET WOLFE (c. 1855-97). An Irish novelist known by her pseudonym The Duchess, though the majority of her books were published anonymously. She was born at Ross Carbery, County Cork, where her father, Fitzjohn Stannus Hamilton, was rector and vicar choral of Ross Cathedral. She was twice married—to Edward Ar-

gles and to Thomas H. Hungerford. The Duchess began to write in 1877—*Phyllis* appearing in that year and her most successful novel, *Molly Bawn*, in 1878—and from that time to her death she published nearly 30 volumes of short stories and novels, which attained a remarkable popularity, and among which *His Geoffrey* (1881), *April's Lady* (1891), and *A Conquering Heroine* (1892) were favorites. They are sentimental and melodramatic, the plot conventional, but the reproduction of the general air and small chatter of society very truly done.

HUNG-SIU-TS'UEN, hūng'sē-ū'chwēn, or HUNG-HSIU-CHUAN (1812-64). A Hakka schoolmaster who originated and was the leader of the Taiping Rebellion (1850-64). He was born in a small village, about 30 miles from the city of Canton, in 1812, attended school from 7 to 16, became village schoolmaster, continued his own studies and passed all the examinations preliminary to that for the first degree, but failed again and again in the competition for the degree. He was subject to frequent illnesses and in one attack, in 1837, is said to have lain in a trance for nearly 40 days, during which he had a religious vision which profoundly impressed him. A few years later a friend found in Hung's bookcase some Christian books and tracts which Hung had obtained in Canton in 1833. The two began to study them, and Hung found in them the key to his visions and was thereby inspired to destroy idols. They became converted, baptized each other, and began to preach. Hung set out for Kwangsi to convert the aborigines there, but lack of acquaintance with their language made the work difficult. He met others, however, who gladly accepted his teaching and themselves became zealous propagandists. About this time he joined a society of "God worshipers," which had been formed in 1836, and soon became supreme in it. In 1845 he returned to his own province, made many converts, and in 1846 visited a Protestant missionary in Canton and studied the Scriptures with him for two months, but was refused baptism, because the request was accompanied with an application for a monthly stipend. He returned to Kwangsi, and his disciples mostly persons disaffected to the reigning dynasty, began to destroy temples and to demolish idols. In July, 1850, Hung and his followers, who were now numerous, broke out into open rebellion. The civil war which followed was more of a revolt against the Manchu monarchy than a religious crusade. At first Hung had styled himself the "Brother of Christ", he now became the "Heavenly King" (T'ien Wang) and adopted the style of "Heavenly Kingdom of Great Peace" (Taiping Kwoh) as that of the empire he was about to establish. He made Nanking his headquarters until 1864, writing Christian books, issuing edicts to his followers, attending to the printing and circulation of the Bible and other works, and directing the movements of his numerous generals and their immense armies.

The great Taiping Rebellion for a while swept all before it. At one time Europe and the United States seriously considered recognizing the rebels, but the lawlessness and excesses of the latter ruined their cause. Finally, the American Ward, and later the English Gordon with his "Ever Victorious Army," succeeded in winning back the lost ground for the monarchy. June 30, 1864, realizing the coming collapse of

the rebellion, Hung poisoned himself. His body was later found and burned. Consult Meadows, *The Chinese and their rebellions* (London, 1856), Brine, *The Taiping Rebellion* (ib., 1862), Lin-Li, *T'ing Tien-K'ueh History of the T'ing Revolution* (2 vols., ib., 1866), W. F. Mayer, *Chinese Readers' Manual* (Shanghai, 1874), Samuel Mossman, *The Great Taiping Rebellion* (London, n. d.). See CHINA.

HUNG-WU, hung'woó'. The name given to the period of years (1368-98) during which Chu Yuan-chang, the founder of the Chinese dynasty of Ming (1368-1644), reigned, and commonly transferred by Europeans to the Emperor himself. He was a native of the Province of Anhui and was born in 1328, the second son of a poor laborer. At 17 Chu entered a monastery as a novice, but in the troubles of the times this was burned down by rebels under the command of a maternal uncle of his, whose forces he joined. He was given a small command and scored victory after victory. In 1355, on the death of his uncle, he was offered the post of assistant generalissimo. Declining this offer, he recovered from the Mongols, then the ruling dynasty, the whole left bank of the Yang-tse and proclaimed himself Prince of Wu. Within two years he had become master of Kiangsi and part of Chekiang, sent his generals north in 1367, in 1368 mounted the throne as Hung-wu, called his dynasty the Ming, or "Illustrious," and made his capital at the city which has since been known as Nanking, "the southern capital." In the same year he recovered the provinces of Fukien, the two Kwang, and Shansi, and brought Shensi under his sway in 1369. In the following year the last Mongol Emperor died, the dynasty founded by Kublai Khan came to an inglorious end, and China was once more free from the yoke of aliens. In 1371 Szechwan and Liaotung fell before him, and Yunnan in 1381.

Hung-wu proved an able administrator, although the success of his government is attributed largely to the excellent counsels of his wife, and became a liberal patron of education and of literature. He organized the present system of literary examinations, established a new penal code, abolished mutilation as a punishment, regulated taxes and placed the coinage on a proper basis, made Buddhism and Taoism state religions, and prohibited eunuchs from holding office. He also reestablished the customs of the T'ang dynasty (618-907), restored the literati to high offices of state, from which they had been excluded since the time of Kublai Khan, and labored for the welfare of his people. He had 24 sons, all of whom became princes, and set nine of them as governors over as many provinces. He died in 1398 and is known in history as Tai-tsu, his temple name. He is popularly known, however, as the "Beggar King," in allusion to his early poverty. See J. P. A. Rémusat, *Nouveaux mélanges asiatiques* (2 vols., Paris, 1829).

HUNKERS (perhaps from Dutch *honk*, station, home). In American political history, the name applied for some years after 1843 to that part of the Democratic party in the State of New York which stood for conservatism and was arrayed against the radical faction of the same party, known as the Barnburners (qv). Factional differences had arisen in the party prior to 1843, but open and avowed antagonism may be said to date from that year. The Hunkers adhered to the regular Democratic

party in the presidential contest of 1848, while their opponents united with the Free Soilers and with them nominated Van Buren. After 1852 the two factions acted more or less in harmony in both State and national politics. Among the leaders of the Hunkers were Horatio Seymour, William L. Marcy, Samuel Beardsley, Edwin Croswell, and Daniel S. Dickinson. The name Hunkers was also applied at times to the conservative element of the Democratic party in other States.

HUNNERIC, or **HUNERIC**. King of the Vandals in Africa (?-484). He was the son of Genseric, whom he succeeded in 477. In 435 he had been sent to Italy as a hostage for his father's fidelity. One of his wives was a daughter of Theodoric, King of the Visigoths. Suspecting her of a plot against him, Genseric had her nose and ears cut off and sent her home. Another and later wife was Eudocia, the daughter of the Roman Emperor Valentinian III. See VANDALS.

HUNOLD, hoo'nólt, CHRISTIAN FRIEDRICH (1680-1721). A German author, known by his pseudonym Menantes. He was born at Wandersleben and studied law at Jena. Means to carry on his studies failed him, however, and in 1700 he went to Hamburg, then the literary centre of Germany. Here the success of his novel, *Die verliebte und galante Welt* (2 vols., 1700), put an end to his precarious teaching and writing. This was quickly followed by *Der europäischen Hofe Liebes- und Heldengeschichte* (1704) and by *Satirischer Roman* (1705 and 1732), which told so plainly the scandal of Hamburg—which Hunold knew only too well—that he was forced to leave the city (1708). He went to Thuringia, published *Die allerneueste Art ein reinen und galanten Poesie zu gelangen* (1706), besides textbooks in rhetoric and style, and after many wanderings settled in Halle, where he became an instructor in literature, poetry, and jurisprudence, and where his works lost the earlier freedom and obscenity. Consult Wedel, *Geheime Nachrichten und Briefe von Herrn Menantes Leben und Schriften* (Cologne, 1731), and Vogel, *Christian Friedrich Hunold* (Leipzig, 1898).

HUNS (Lat. *Hunni*, *Chunni*, Gk. *Oúvvoi*, *Oúvnoi*, *Χούvροι*, *Chounnoi*, probably from Chin *Hiong-nu*, name of a powerful Tartar tribe). The name of a nation of antiquity which made repeated incursions upon the Roman dominions, and under Attila (qv), the most renowned of its leaders, brought the empires of both the East and the West to the verge of destruction.

The Huns are generally considered to have been a collection of tribes of Turko-Tatar affinities, descendants perhaps of the Hiong-Nu, who figure in Chinese annals as making incursions and founding states in Central Asia as early as the second century B. C. Some authorities think that the bulk of Attila's hordes were of Turke stock, and Theophanes in the eighth century writes of "the Huns whom we commonly call Turks." The distinction between "white" and "black" Huns, made by the mediæval writers, led Bloch (1901) to put forward the view that we have here a dark race in process of transformation into a white one, but the uncertainty of the connotation of these epithets makes such a startling view even less probable. Like the modern Magyars, Osmanlı Turks, etc., the ancient Huns no doubt assimilated themselves to the populations of their environment, and in Europe lost more and more of the distinctly

Asiatic character. The "white" Huns were probably not a little mixed with Asiatic Aryan blood (Iranian, etc.) before they entered upon their career in Europe. About 200 B.C. the Huns overran the Chinese Empire, defeated the Chinese armies in numerous engagements, and drove the Emperor Kao-ti himself to a capitulation and a treaty. During the reign of Wu-ti (141-87 B.C.) the power of the Huns was much broken. Eventually they separated into two distinct camps, one of which, amounting to about 50,000 families, went southward, while the other endeavored to maintain itself in its original seat, but finally the most warlike went west and northwest in search of new homes. Of those that went northwest a large number established themselves for a while on the banks of the Volga. They then, under a leader named Balamir, or Balamber, advanced into the territories of the Alani (qv), a powerful people dwelling between the Volga and the Don. At what period this took place is uncertain, but probably it was early in the fourth century. The Alani resisted the incursions of the Huns until at length a battle was fought on the banks of the Don, in which the King of the Alani was slain and his army utterly routed, the vast majority of the survivors joined the invaders.

The Huns now invaded the country of the Ostrogoths, whose aged King, Hermannrich, roused himself to meet the invaders, but in vain. His successor, Withimn, encountered the Huns in a pitched battle, in which he was himself slain and his countrymen utterly routed. The Ostrogoths now threw themselves upon the protection of the Emperor Valens, who in 376 A.D. gave permission to a great number of them to cross the Danube and settle in the countries on the south side of the river as auxiliaries to the Roman arms against further invasion. The Huns now occupied all the territories that had been abandoned by the Goths, and when the latter not long afterward revolted against Valens, the Huns also crossed the Danube and joined their arms to those of the Goths in hostilities against the Empire of the East. In the wars that followed the Huns were not so conspicuous as the Goths, their former enemies, and but little is known of them during the remainder of the fourth century. It is supposed, however, that early in the following century they were joined by fresh hordes. In the reign of Theodosius the Younger they had increased so considerably in power that to their sovereign Rugilas, or Roas, was paid an annual tribute of about \$70,000 to secure the Empire of the East from further injury.

Rugilas, dying in the year 434, was succeeded in the sovereignty of the Huns by his nephews Attila and Bleda. The latter was put to death by his brother about 444. Attila (qv) carried his arms as far west as Gaul, where the Romans and the Visigoths successfully encountered him in the Catalaunan Plain. In the following year he ravaged Italy, and Rome itself was saved, it is said, only through the awe which its Bishop, Leo I., inspired in the barbarian conqueror. With Attila's death, about 454, the power of the Huns was broken. A few feeble sovereigns succeeded him, but there was strife now everywhere among the nations that had submitted to Attila, and the Huns never regained their power. Many of them took service in the armies of the Romans, and others joined fresh hordes of invaders from the north and the east,

aiding them in their repeated attacks upon the Empire. Consult J. B. Bury, *History of the Later Roman Empire* (2 vols., New York, 1889); Thomas Hodgkin, *Italy and her Invaders* (8 vols., Oxford, 1892); Parker, *A Thousand Years of the Tartars* (1905). See GOTHIS.

HUNT, ARTHUR SURRIDGE (1871-). An English paleographer, born in Romford, Essex. He was educated at Queen's College, Oxford, of which he became fellow, and was demy of Magdalen in 1896-1900 and fellow of Lincoln in 1901-06. In 1895 he began his important research in Egypt which resulted in the discovery of many important Greek papyri. These he edited mostly with B. P. Grenfell (qv). Hunt received honorary degrees from the universities of Königsberg, Graz, Athens, Dublin, and Glasgow, and was made professor of papyrology at Oxford.

HUNT, CHARLES WALLACE (1841-1911). An American engineer, born at Candor, Tioga Co., N. Y. In 1864 he was a special agent of the United States War Department to care for the freedmen. Later he engaged in engineering and manufacturing and became vice president of the Richmond County (N. Y.) Savings Bank. He served as president of the American Society of Mechanical Engineers in 1893 and of the United Engineering Society in 1909 and was a member of other engineering and scientific societies.

HUNT, GAILLARD (1862-). An American writer on history and government, son of W. H. Hunt (1824-84) and brother of W. H. Hunt (1857-). Born at New Orleans, La., and educated at the Emerson Institute, Washington, he represented the State Department at the World's Fair, Chicago (1893), served as chief of the Bureau of Citizenship (1900-09), and was chief of the division of manuscripts in the Library of Congress after 1909. In 1913 he lectured at Johns Hopkins University. Besides editing *Fragment of Revolutionary History* (1892), *The Writings of James Madison* (8 vols., 1900-10), and *The Journals of the Continental Congress*, vols. xvi-xviii (1909), he is author of *History of the Seal of the United States* (1892, 2d ed., 1909), *The Department of State of the United States Its History and its Functions* (1892, 2d ed., rev., 1914), *The American Passport* (1898), *Life of James Madison* (1902), *Disunion Sentiment in Congress in 1794* (1905), *John C. Calhoun* (1908), *Life in America One Hundred Years Ago* (1914).

HUNT, HELEN. See JACKSON, HELEN (FISKE HUNT).

HUNT, HENRY (1773-1835). An English politician, born at Widdington Farm, Wiltshire, and educated by tutors and in private schools. Though educated for the ministry, he turned to farming, which he followed intermittently until within a few years of his death. He was imprisoned in 1800 for challenging to a duel the commanding officer of the Marlborough Troop, in 1810 for an assault upon a gamekeeper, and again in 1819 for two years for his part in the Peterloo massacre. In politics he was a Radical, and allied himself with Sir Francis Burdett, Horne Tooke, William Cobbett, and others of the same party, though he later published a pamphlet in which Burdett was charged with wavering loyalty to the reform, and was alienated from Cobbett through his own overzealousness and political mistakes. He was often a candidate for Parliament and contested many elections. In 1830, through the retirement of

the successful candidate, he obtained a seat from Preston and advocated strenuously women's rights, universal suffrage, and the repeal of the 'On-Laws. He managed to exercise considerable influence upon local politics, and his public speeches, though positive and demagogic, were always impressive, but his disagreeable personality found him few followers in Parliament, and in 1833, having failed of reelection, he retired to private life. Consult *Memoirs of Henry Hunt, written by himself in His Majesty's Jail* (London, 1820).

HUNT, HENRY JACKSON (1819-89). An American soldier, born in Detroit, Mich. His father, Samuel W. Hunt, was an army officer, and after his death the son was appointed to West Point, where he graduated in 1839. He was immediately assigned to the artillery arm of the service. His first active service was on the Canadian frontier in 1839, during the disturbances arising from the Canadian Rebellion, after which he continued in garrison duty until the Mexican War. He served with the Second Artillery in Scott's advance from Vera Cruz to the city of Mexico, distinguishing himself particularly at Contreras and Churubusco, and being twice wounded at the battle of Molino del Rey (Sept 8, 1847). He was brevetted captain and major for his services. He afterward served on the frontier for some years and in 1856 was appointed a member of the board to revise the system of light-artillery tactics. He was promoted captain in 1852, and at the outbreak of the Civil War was stationed at Fort Pickens, Fla., from April to June, 1861. Promoted major in May of that year, he commanded the artillery on the extreme left at the battle of Bull Run. He was in command of artillery in the defenses of Washington in the summer of 1861, and in the September following was promoted colonel, attached to General McClellan's staff, and assigned to organize and command the artillery reserve of the Army of the Potomac. He served throughout the Peninsular campaign, his disposition of the artillery at the battle of Malvern Hill (July 1, 1862) being especially praiseworthy, and in September became chief of artillery of the Army of the Potomac, a position which he held until the end of the war. He participated in the battle of South Mountain on Sept 14, 1862, and on the following day was appointed brigadier general of United States volunteers. He served thereafter at Antietam, at Fredericksburg, where his artillery fire rendered possible the crossing of the Rappahannock, at Chancellorsville, and at Gettysburg, where the withering fire from his batteries rendered impossible the success of Pickett's brilliant charge and turned the tide of battle in favor of the Federal arms. After serving in the Wilderness campaign with distinction he continued on Grant's staff until the close of hostilities, receiving the brevet ranks of major general of volunteers and brigadier general in the United States army. In the winter of 1865-66 he was in command of the military district of Arkansas. In 1866 he was made colonel in the reorganized army, placed in command of the Fifth Artillery, and appointed president of the permanent Artillery Board. He commanded the Department of the South from 1880 to 1883, when he retired and became governor of the National Soldiers' Home at Washington. He published *Instruction for Field Artillery* (1860) and three articles on the battle of Gettysburg in the *Century* (New

York, 1886), later republished in *Battles and Leaders of the Civil War* (1b, 1887).

HUNT, (WILLIAM) HOLMAN (1827-1910). An English religious painter, born in London. He was intended for commercial life, and worked in an office in London for four years, devoting his leisure to reading, drawing, and painting. In his seventeenth year he gave up business and hired a studio, which he paid for with difficulty by painting family portraits and making copies and restorations. In 1844, on his third attempt, he was admitted as a probationer to the schools of the Royal Academy, and in 1845 became a regular student. In 1846 he exhibited at the Academy "Hark," a picture of his little sister holding a watch to her ear. Together with Rossetti and Millais, Hunt founded the Pre-Raphaelite Brotherhood (qv). His first painting that was an exponent of its principles was "The Flight of Madeline and Porphyro," a subject taken from Keats's *Eve of St Agnes*. The most constant follower of Pre-Raphaelitism, he remained unaffected by later art movements. He devoted himself principally to religious subjects, for which he was peculiarly adapted, and became one of the greatest modern exponents of Christianity. His works are full of strong religious feeling and are characterized by an absolute fidelity to nature, to the extent of a hard realism. Every detail, even the leaves and blades of grass, is painted with the utmost minuteness. His works are the triumph of industry. He went to Palestine to study the figures and landscapes of his religious subjects, spending four years there in preparation for his picture "Finding of Christ in the Temple." His industry was richly rewarded by the public, which bought the latter picture for £5000 and "The Shadow of Death" for £10,000. In 1905 he received the Order of Merit, and on his death in 1910 was buried in St Paul's Cathedral with national honors.

The best known of Hunt's works is his "Light of the World," now in Keble College, Oxford (a life-size version is in St Paul's Cathedral, London). It represents Christ, the crown of thorns on His brow and a lantern in His hand, standing before a closed door, it is executed with great detail and realism. Among Hunt's earlier works are a "Converted Christian Family Sheltering Christian Missionaries from the Druids," in the Taylor Museum, Oxford, "Rienzi Vowing to Avenge his Brother's Death," the "Hiring Shepherd," and the "Awakened Conscience." The "Scapegoat" is a strange religious production, representing a goat perishing among the miasmas of the Dead Sea. In the Gallery of Birmingham is the "Finding of Christ in the Temple," at Manchester, the "Shadow of Death," also called "Christ, the Carpenter," and "Valentine and Silvia"; at Liverpool, the "Triumph of the Innocents." Among his latest works were "Isabella and the Pot of Basil," "May Morning in Magdalen Tower," "Holy Fire in the Church of the Sepulchre of Jerusalem." Consult G C Williamson, *Holman Hunt* (New York, 1902), W H Hunt, *Pre-Raphaelitism and the Pre-Raphaelite Brotherhood* (2 vols, 1b, 1906), M E Coleridge, *Holman Hunt* (1b, 1908), T L Hare, *Leaders of English Pre-Raphaelites* (1b 1909).

HUNT, ISAAC (1751-1809). An English lawyer and Loyalist in the American Revolutionary era, father of Leigh Hunt the poet. He was born in Barbados, West Indies, was sent to school

in Philadelphia and studied law there, but the college declined to grant him an M.A. degree on account of his anonymous literary productions, which were highly displeasing to the popular sentiment of the time. When the Revolution was actually in progress, he was mobbed and imprisoned for his activity in the royal cause, but fled to England where he entered the Church. After preaching in London for a time he became a private tutor and wrote *The Political Family, or a Discourse Pointing out the Reciprocal Advantages which Flow from an Uninterrupted Union between Great Britain and her American Colonies* (1775), and *Right of Englishmen, an Antidote to the Poison of Thomas Paine* (1791).

HUNT, JOHN (1812-48) An English Wesleyan clergyman and missionary, born at Balderton, Nottinghamshire. For nearly three years he studied at the Wesleyan Theological Institution at Hoxton. In 1838 he went as a missionary to the cannibals of the Fiji Islands and labored among them until his death, achieving marvelous results. He was the author of the following volumes, all published posthumously: *Entire Sanctification Its Nature, the Way of Attainment and Motives for its Pursuit* (1853), *Memoir of Rev W. Cross, Missionary to the Friendly and Feejee Islands* (1848, 2d ed., 1858), *Wesley and Wesleyanism* (London, 1868). Consult G. S. Rowe, *The Life of John Hunt, Missionary to the Cannibals* (London and New York, 1859), and Joseph Nettleton, *John Hunt, Pioneer Missionary and Saint* (London, n.d.).

HUNT, (JAMES HENRY) LEIGH (1784-1859) An English poet and essayist, born at Southgate, Middlesex, Oct. 19, 1784. He was a son of Isaac Hunt (q.v.). His mother was of Quaker descent. The boy was educated at Christ's Hospital, London. While at school he wrote verse in imitation of Collins, Gray, and others. A selection of these juvenile poems his father helped him to publish in 1801, under the title *Juvenalia*. In 1805 Leigh attracted some notice by his theatrical and literary criticism in the *News*, a short-lived paper started by his elder brother, John. Two years later he made out of these contributions a book entitled *Critical Essays on Performers of the London Theatres*. He also served as clerk in the office of his brother Stephen, who was an attorney, and for a short time he occupied a minor post in the War Office. In 1808 he joined with his brother John in founding a newspaper called the *Examiner*, of which he was editor for 13 years. In this paper, in 1816, he presented Keats and Shelley to the public. Hunt was a Liberal in politics before Liberalism had become fashionable; and for one of his articles, reflecting on the obesity of the Prince Regent—"a fat Adams of fifty," Hunt had called him—he was sentenced to pay a fine of £500 and to undergo two years' imprisonment. Hunt was happy enough in his confinement, he hid the prison bars with flowers and received visits from Byron, Shelley, and Keats. Released in 1815, he published the next year *The Story of Rimini*, a verse narrative based on Dante's episode of Paolo and Francesca.

In 1818 appeared a volume of original poems and translations entitled *Foliage*. The next year he started another journal, the *Indicator* (continued for 76 weeks), in which first appeared some of his best essays. In 1821, having severed his London literary connections, he went to

Italy to assume the editorship of a journal projected by Byron and Shelley. There were annoying delays, Shelley died, Byron and Hunt quarreled, and of this journal, called the *Liberal*, only four numbers appeared (1822-23). Returning to London, Hunt gave his version of the enterprise in *Lord Byron and Some of his Contemporaries* (1828). In the same year he began the *Companion* (28 numbers), a sequel to the *Indicator*. In 1834 he started the *Leigh Hunt's Journal*, which he edited for about two years. His principal works, besides those already mentioned, are *Captain Suord and Captain Pen* (1835), a poem, *Legend of Florence* (1840), a fine play, *The Seer* (1840), a selection from his essays in various magazines, some remarkable prefaces to an edition of the Restoration dramatists (1840), *Palfrey, A Love Story of Old Times* (1842), *One Hundred Romances of Real Life* (1843), made up from contributions to his *Journal* in 1834-35, *Imagination or Fancy*, containing the well-known essay on *What Is Poetry?* (1844), a volume of his collected poems (1844), *Wit and Humour*, selections from the English poets, with comments (1846), *Stories from the Italian Poets, with Lives* (1846), *Men, Women, and Books*, a delightful collection of miscellanies (1847), *A Jar of Honey from Mount Hybla* (1848), made up mostly of contributions to *Amusements Magazine* in 1844, the *Autobiography* (1850, enlarged, 1860), *Table Talk* (1851), *The Old Court Suburb* (1855). In spite of his industry, Hunt was always poor. In 1844 Sir Percy Shelley settled upon him a pension of £120, which was augmented in 1847 by a government pension of £200. He died at Putney, Aug. 28, 1859.

Hunt undoubtedly wrote too much, but the best of his poems and essays render his reputation secure. *The Story of Rimini* is one of the finest narrative poems since Dryden, his *Palfrey* is delightful from its good spirits and bright, sunny glimpses of landscape and character, and *Abou-ben-Adhem* is a charming fable. As an essayist he is always cheerful and fanciful, and as a critic he is subtle and appreciative. His style is graceful.

Bibliography. *Autobiography*, ed. by his son, T. Hunt (London, 1860), *Poetical Works* (ib., 1860) and *Correspondence* (ib., 1862). Ireland, *List of Writings of Hazlitt and Hunt* (ib., 1868), *Recollections of Charles and Mary Cowden Clarke* (ib., 1878). Monkhouse, *Life of Hunt*, in "Great Writers Series" (ib., 1893). Johnson, *Leigh Hunt* (ib., 1896), selections from works by Ollier (ib., 1899, new ed., 1890), Symonds (ib., 1887), Kent (ib., 1889), *Tales, with memoir*, by Knight (ib., 1890), *Classical Tales* (ib., 1894), *Dramatic Essays*, selected by Archer and Lowe (ib., 1894), Johnson (ib., 1900-02); reprint of *The Months*, edition of 1821, with introduction by Andrews (ib., 1897), B. Miller, *Leigh Hunt's Relations with Byron, Shelley, and Keats* (New York, 1910). C. T. Winchester, *A Group of English Essayists* (ib., 1910).

HUNT, RUD (1870-) An American pharmacologist, born at Martinsville, Ohio. He was educated at Johns Hopkins University (A.B., 1891; Ph.D., 1896), at the University of Bonn, and at the College of Physicians and Surgeons, Baltimore (M.D., 1896). He taught physiology at the College of Physicians and Surgeons (Columbia) in 1896-98, was associate and associate professor of pharmacology at Johns Hopkins from 1898 to 1903, served as chief of

division and professor of pharmacology in the United States Public Health Service from 1904 to 1913, and thereafter was professor of pharmacology in Harvard Medical School. He is author of *Studies in Experimental Alcoholism* (1907); *Studies on the Thyroid* (1909), with Atherton Seidell, *Effects of Various Diets upon Resistance of Animals to Poisons* (1910), *Effects of Derivatives of Choline and Analogous Compounds on the Blood Pressure* (1911), with R. de M. Taveau. He also contributed to Heffter's *Handbuch der Experimental-Pharmakologie* (1914).

HUNT, RICHARD MORRIS (1828-95). An American architect, born at Brattleboro, Vt., the brother of William Morris Hunt. At 15 he began the study of architecture in Geneva, Switzerland, and five years later entered the Ecole des Beaux-Arts in Paris, the first of American students there. After travel in Europe, Asia, and Egypt, he was employed as inspector of works on the Louvre, and, under his old master Lefuel, who had succeeded Visconti, he had charge of the details of the Pavillon de la Bibliotheque. In 1855 he returned to his own country, worked under Walter on the Capitol extension at Washington, and later established in New York the earliest American atelier, or studio, of architecture, which became a nursery of great architects and the pioneer of all American training schools of architecture. He was the designer of the Lenox Library, the Tribune Building, New York, the United States Naval Observatory at Washington, the Divinity Building at Yale, the Administration Building for the World's Fair, Chicago, the Yorktown Monument, the earlier buildings of Hampton Institute (Virginia), the pedestal of the statue of Liberty in New York harbor, and the Fogg Museum of Harvard University. Among private houses by him are those of H. G. Marquand, W. K. Vanderbilt, New York, the country house of George Vanderbilt, Baltimore, N. C., and several beautiful summer houses at Newport, R. I., including Mrs. O. H. P. Belmont's "Marble House," and "The Breakers." Mr. Hunt exercised a powerful influence on the architecture of America—less, perhaps, by the intrinsic merit of his designs, though they were often of a high order, than by the inspiring force of his personality. He was one of the founders and in 1888 became president of the Institute of Architects. He was Chevalier of the Legion of Honor and a foreign associate of the Institute of France. In 1898 the associated architectural and art societies of New York City erected a beautiful memorial to him, including a bust, inserted in the Central Park wall, it faces Fifth Avenue at Seventieth Street. Consult "Richard Morris Hunt. His Art and Work," in *Architecture and Building*, 1895 (New York, 1895).

HUNT, ROBERT WOOLSTON (1838-) An American metallurgical engineer, born in Fallsington, Bucks Co., Pa., and educated at Covington, Ky. He worked in a rolling mill at Pottsville, Pa., studied chemistry at Philadelphia (1859-60), and served as superintendent of steel and iron works at Wyandotte, Mich., at Troy, N. Y., and elsewhere until 1888, when he became head of Robert W. Hunt & Co., consulting engineers and inspectors of steel. He was president of the American Institute of Mining Engineers (1883 and 1906), of the American Society of Mechanical Engineers (1891), and of the Western Society of Engineers (1893).

HUNT, THOMAS STERRY (1826-92). An

American scientist born at Norwich, Conn. He studied chemistry and acted as laboratory assistant at Yale College. In 1847 he was made chemist and mineralogist to the Geological Survey of Canada and, while holding this position, was also for several years professor of chemistry at Laval and McGill universities. In 1872 he resigned his position on the Geological Survey to become professor of geology at Massachusetts Institute of Technology, and six years later he retired from official service. His extensive and fruitful researches in general and economic geology, in pure and applied chemistry, and in mineralogy, won for him a place of eminence in the scientific world, and universities and learned societies the world over conferred upon him their honors. He was made a fellow of the Royal Society of London, Chevalier of the Legion of Honor in France, and an honorary doctor of laws of the University of Cambridge, and served as president of the American Association for the Advancement of Science (1870), the American Institute of Mining Engineers (1876), the American Chemical Society (1879 and 1888), and the Royal Society of Canada (1884). Besides a very large number of papers on special scientific topics, his publications include the following works: *Chemical and Geological Essays* (1874), *Azoic Rocks* (1878), *The Domain of Physiology* (2d ed., 1882), *Mineral Physiology and Physiography* (1886), *A New Basis for Chemistry* (1887), *Systematic Mineralogy* (1891).

HUNT, WARD (1810-80). An American jurist, born in Utica, N. Y. He was educated at Union College, prepared himself for his legal career in Litchfield, Conn., and after following his profession for many years in his native town, of which he was mayor in 1844, he was raised to the Court of Appeals in New York (1865) and seven years later to the bench of the United States Supreme Court. This position he occupied for 10 years and then retired with a pension.

HUNT, WILLIAM (1842-) An English clergyman and historian. He was educated at Harrow and at Trinity College, Oxford, was vicar of Congresbury, Somerset, in 1867-82, and then went to London as a reviewer and contributor to the *Dictionary of National Biography*. He was president of the Royal Historical Society in 1905-09 and wrote *The English Church in the Middle Ages* (1888), *The English Church, 597-1066* (1899), the first volume in a series of which he was editor, the tenth volume of the *Political History of England* (1905-07), of which he was joint editor with R. Lane-Poole. *The Irish Parliament of 1775* (1907), edited from a contemporary manuscript.

HUNT, WILLIAM HENRY (1790-1864). An English water-color painter of still life, genre, and landscapes. He was born in London the son of a tin-plate worker, and was a cripple from childhood, but he early became the apprentice pupil of John Varley (qv) and one of the proteges of Dr. Thomas Munro, of Adelphi Terrace. In 1807 he exhibited at the Royal Academy and the next year, on the advice of William Mulready, entered the schools of the Academy. His early work was largely in oil, but after 1824, when he became an associate of the Water-Color Society (member, 1826), he devoted himself almost exclusively to water colors and between 1824 and 1831 exhibited 153 drawings, of which 8 were candlelight scenes, and 60 were figures of fisher folk at Hastings. From

1831 to 1851 he exhibited on an average 25 drawings a year. At his death, in 1864, he left a fortune of £20,000. After 1826 still life, flowers, fruit, vegetables, game, and poultry, began to predominate in his drawings over figures and landscapes. Because of his lameness he painted many of his landscapes from the windows of his house at Hastings, where he spent part of each year for 30 years. Though a man of little general culture, he had a strong vein of humor, as illustrated by drawings that chromolithography has popularized, such as "Massa Sambo," "Too Hot," "The Card Players," "The Young Shaver," "The Attack," and "The Defeat." In the Tate Gallery there are five of his drawings, in the Victoria and Albert Museum, 36. Important private collections were made by Louis Huth and James O'Rook. While Hunt's subjects are simple, his treatment of them is unexcelled, and technically he possessed all the resources of water color. Ruskin said of him: "He was, take him for all in all, the finest painter of still life that ever existed." Consult Ruskin, *Notes on Samuel Prout and William Hunt* (London, 1879), Richard and Samuel Redgrave, *Century of Painters of the English School* (2d ed., 1b, 1890), J. L. Roget, *History of the Old Water Color Society* (2 vols., 1b, 1891).

HUNT, WILLIAM HENRY (1824-84) An American lawyer and public official, born in Charleston, S. C. After studying for two years at Yale College in the class of 1843, he removed to Louisiana, studied law, and was admitted to the bar in 1844. During the next 30 years he lived in New Orleans, practicing law and serving as professor in a law school. Throughout the Civil War he favored the Union cause and even afterward remained a staunch Republican. In 1876 he was appointed Attorney-General of Louisiana to fill a vacancy and was regularly nominated for that position in the same year, but the vote was contested and largely through the agency of President Hayes the Democratic candidates were placed in office. Hunt was made a judge of the United States Court of Claims in 1878, was prominently mentioned two years later as a successor to Justice Strong on the Supreme Court bench, and in 1881 was appointed by Garfield Secretary of the Navy, after he had declined the judgeship of the United States Circuit Court of the Fifth District. He retired when Arthur reorganized Garfield's cabinet and in 1882 was made Minister to Russia.

HUNT, WILLIAM HENRY (1857-) An American judge, son of the preceding and brother of Gaillard Hunt. He was born in New Orleans, La., and was educated at Yale University. He served as collector of customs for Montana and Idaho (1881-85) and in Montana as Attorney-General (1885-87), member of the Legislature (1889), district judge of the First Judicial District (1889-94), and justice of the Supreme Court (1894-1900). For a year after this he was Secretary of Porto Rico, and from 1901 to 1904 he was Governor. He returned to the bench as United States district judge for the District of Montana, in 1910-11 was associate judge of the United States Court of Customs Appeal, and from 1911 to 1914 served as associate judge of the United States Commerce Court.

HUNT, WILLIAM MORRIS (1824-79) An American landscape, figure, and portrait painter. He was born at Brattleboro, Vt., March 31, 1824,

the son of a member of Congress and brother of the architect R. M. Hunt. He entered Harvard College in 1840, but, compelled to leave on account of his health, he traveled in Europe. He studied sculpture for a short time at Rome with H. K. Brown and in Paris under Barye, but in 1846 took up painting at the Academy of Düsseldorf. Dissatisfied with the methods there, he worked five years as the favorite pupil of Couture in Paris. Attracted to Barbizon, he became a friend and follower of Millet, who exercised the strongest influence on his art. In 1855 Hunt returned to the United States and soon afterward established himself in Boston. There he became a very successful teacher of painting and exercised a marked influence upon American art. He taught his pupils the new art methods of Paris and influenced large classes, not only by the superiority of his aims, but by his own work. His criticisms and sayings in his studio were compiled and edited by his pupil Helen M. Knowlton and published under the title *Talks on Art* (3 vols., Boston, 1875-82). Under sudden derangement he committed suicide at the Isles of Shoals, Sept. 8, 1879. His work is fine in color and masterly in execution. At first he showed a preference for figure subjects—peasants, children, flower girls, and Parisian types. In portrait painting his aim was to represent the character of the person, even at the expense of finish in the accessories. His later subjects were principally landscapes, in which he showed largeness of style and vigor of execution.

Among his most important figure subjects are "Head of a Jewess," "Sheep Shearing at Barbizon," "The Farmers' Return," "The Fortune Teller," "The Prodigal Son." The Boston Museum contains a number of his works: "Girl with the Kitten," "Girl Reading," "Peasant Girl at Barbizon," "Marguerite," "Hurdy-Gurdy Boy," and a portrait of the artist. In the Metropolitan Museum of Art are seven examples, including an excellent "Landscape" in the Barbizon style, "Girl at a Fountain," and "The Bathers." His portraits include those of Chief Justice Shaw (Court House, Salem), one of the best portraits painted in America, Mrs. F. G. Ward, Mrs. Charles Francis Adams, Mrs. G. W. Long, William H. Gardner, and William M. Evarts. Among his landscapes are "Gloucester Harbor," "Newton Lower Falls," "Coast Scene at Magnolia, Mass.," and "Dead in the Snow." His most ambitious works, the "Flight of Night" and "Discovery," colossal decorations in the Capitol at Albany, were executed in 1878, not long before his death. They were hopelessly damaged by the cracking of the stone on which they were directly painted, and were concealed by later additions to the ceiling, but the sketches show them of lofty conception and magnificent movement. Two of these studies are in the Metropolitan Museum, New York. Consult Hinton, in *American Art Review* (New York, 1880), H. M. Knowlton, *The Art Life of William Morris Hunt* (Boston, 1899), Samuel Isham, *History of American Painting* (New York, 1903), Hunt, in *Masters in Art* (Boston, 1908).

HUNTER, DAVID (1802-86) An American soldier, born in Washington, D. C. He graduated at West Point in 1822 and from 1833 to 1836 served as captain of dragoons in the Far West. He held the rank of major throughout the Mexican War, entered the Civil War as colonel of the Sixth Cavalry, and headed the

Second Division of the Army of the Potomac at the first battle of Bull Run, where he was severely wounded. He was afterward promoted to be a major general of volunteers (1861), commanded the Western Department and the Department of Kansas, was then appointed head of the Southern Department, and was the first to enlist colored troops. He gave a premature order in 1862 for the manumission of slaves in Georgia, Florida, and South Carolina, which President Lincoln countermanded, but the Confederate Congress outlawed the author. In 1864 Hunter was head of the Department of West Virginia and led 18,000 men to an unsuccessful attack upon Lynchburg, leaving the valley of Virginia exposed by his retreat. General Grant defended his reputation when it was attacked. Hunter presided at the court which tried the conspirators in the assassination of Lincoln. At the close of the war he was brevetted brigadier and major general in the regular army. He was retired from active service July 31, 1866.

HUNTER, EDWARD (1839-). An American soldier, born at Gardiner, Me. He graduated at West Point in 1865, was commissioned in the army as second lieutenant of the Twelfth Infantry, U S A. In 1867-69 he was aid-de-camp to General Getty at Santa Fe, N Mex., and participated in the battle of Dec 25, 1868, against the Apachoe and Cheyenne Indians. Transferred to the First Cavalry, U S A., in 1870, until 1886 he served in California, Nevada, Washington, and Montana, and in 1879 was promoted to be captain. In 1888 he became major and judge advocate and as such served in the Division of the Pacific and the Department of California from 1889 to 1895. He was made lieutenant colonel in 1895 and served as deputy judge advocate in the Department of Dakota until 1898 and in that year went with General Brooke to Porto Rico as judge advocate. Later he was judge advocate of the Department of the East. He retired in 1903.

HUNTER, GEORGE LELAND (1867-). An American authority on decorative art. He was born at Bellingham, Mass., and was educated at Phillips Exeter Academy and at Harvard University (A.B., 1889). After teaching privately for a decade in Chicago he removed to New York, devoting his attention to the decorative arts, particularly to textiles and furniture. The fruits of his wide studies in European and American collections, both public and private, were published in many magazine articles and in several books. His *Tapestries, their Origin, History, and Renaissance* (1912) is the best book in English on the subject. He published also *Home Furnishing* (1913) and *The House that Jack Built* (1914), organized important loan exhibitions of tapestries in connection with lecture promenades, in museums and elsewhere, and had charge of the department of decorative arts in the second edition of the *NEW INTERNATIONAL ENCYCLOPEDIA*.

HUNTER, GORDON (1863-). A Canadian jurist. He was born at Beamsville, Ontario, and was educated at the Brantford Collegiate Institute and at Toronto University where he graduated in 1885. He studied law and was called to the Ontario bar in 1888, but went to British Columbia and was called to the bar of that province in 1892. He was first official law reporter to the British Columbia Supreme Court, but resigned in 1894 and engaged successfully in the practice of his profession.

In 1902 he was appointed Chief Justice of British Columbia. In the following year he also became a royal commissioner for the purpose of investigating strikes and lockouts between mine owners and their employees throughout British Columbia. In 1908 he was administrator of the Provincial government.

HUNTER, HERNE THE See **HERNE THE HUNTER**

HUNTER, JOHN (1728-93). A celebrated English physiologist and surgeon, born at Long Calderwood, Glasgow, Scotland, the youngest of 10 children. After a deficient primary education he was apprenticed to a cabinetmaker, but in 1748 he began to make up deficiencies in his education and applied himself to anatomy under his brother's tuition. During this period he demonstrated the manner of the descent of the testis to the scrotum in foetal life, studied the placental circulation, traced the distribution of the olfactory nerve in the nose, and, with his brother William, elucidated the function of the lymphatic system. He studied under Cheselden at Chelsea Hospital and under Pott between 1749 and 1753 and at Oxford from 1753 to 1754, became a hospital pupil in surgery in 1754, and was made house surgeon at St George's Hospital in 1756. He joined the army as staff surgeon, serving in France and Portugal from 1761 to 1763, practiced surgery in London from 1763, was made a fellow of the Royal Society in 1767, became surgeon to St George's Hospital in 1768, surgeon extraordinary to the King in 1776, and deputy surgeon-general to the army in 1786. He received the Copley medal from the Royal Society in 1787. Hunter was an indefatigable student of comparative anatomy, physiology, and botany. At his house at Earl's Court, from 1772 until his death, he kept and studied creatures from all quarters of the globe. Fishes, birds, lizards, hedgehogs, silkworms, leopards, hornets, and wasps are mentioned among the objects of his study and observation. He lodged shot in the leg bones of young pigs at definite distances and then fed them with madder, which stains living and growing tissues, and demonstrated the manner in which bones grow. He first discovered the principle of compensatory development of blood vessels under the "stimulus of necessity." He tied the common carotid artery of a buck and noted that cutting off its main blood supply did not materially interfere with its growth and development. Dissection of the animal later showed that small branches above and below the place of tying had enlarged sufficiently to meet the physiological demand. This discovery emboldened him to ligate the great arterial trunks in cases of aneurism, relying on the establishment of collateral circulation to prevent death of the limb. His first operation on this theory was a ligation of the femoral artery, for aneurism, in the fibrous sheath (still known as Hunter's canal) where it passes through the muscles of the thigh. He is said to have dissected over 500 different species of animals, many of them repeatedly. Hunter died in his sixty-fifth year, of a spasmodic heart attack brought on by a somewhat acrimonious discussion at a board meeting, over the admission of pupils to St George's Hospital. He was of a warm temperament and was subject in his later years to such attacks. He was a man of great industry, the boldest and best operative surgeon of his day as well as the greatest anatomist known and a marvelous zoologist. His museum

contained at the time of his death 10,563 specimens and preparations illustrative of human and comparative anatomy, physiology, pathology, and natural history. He died in comparative poverty, and his collection was purchased, two years after his death, by the government for £15,000 and was presented to the Royal College of Surgeons. In addition to numerous papers contributed to the *Transactions* of the Royal and other learned societies, he published the following independent works: *A Treatise on the Natural History of the Human Teeth* (part 1, 1771, part 2, 1778), *A Treatise on the Venereal Disease* (1786), *Observations on Certain Parts of the Animal Economy* (1786), *A Treatise on the Blood, Inflammation, and Gun-shot Wounds* (1794). Consult Palmer, *The Works of John Hunter, FRS, with Notes* (4 vols., London, 1838). To this is prefixed *The Life of John Hunter, FRS*, by Otley.

HUNTER, JOHN DUNN (c1798-1827). An American adventurer from a Southern settlement who claimed that he had been captured and reared by Western Indians. His account of explorations with them and of their manners and customs was ultimately discredited, but it is certain that when he came to New Orleans in 1817 he knew no English, and that he studied it there and in Kentucky. He was lionized while visiting England, but on his return to America did nothing but make trouble among the Mexicans and Indians and was finally killed by one of the latter. The work by which he is known was published in London and Philadelphia and translated into German and Swedish. The English edition is called *Memoirs of a Captivity among the Indians of North America from Childhood to the Age of Nineteen* (1823).

HUNTER, JOSEPH (1783-1861). An English literary antiquary, born at Sheffield. He studied for the Presbyterian ministry, in 1809 was appointed to a congregation in Bath, and in 1833 removed to London, where he became sub-commissioner of the public records and assistant keeper (1838). His researches began in early life and extended over his entire career. He edited various volumes of records, made discoveries in regard to the first settlements in America, and illustrated the text of Shakespeare's plays by investigations in many directions. His voluminous notes are now in the British Museum. Among his publications are *Hallamshire* (1819, enlarged, 1869), *Disquisitions on Shakespeare's Tempest* (1839), *New Illustrations of the Life, Studies, and Writings of Shakespeare* (1845), *Milton* (1850), *Robin Hood* (1852), *The Founders of New Plymouth* (1854), and *The Church and Congregation of Protestant Separatists at Scrooby* (1854).

HUNTER, MRS LEO. See PICKWICK CLUB.

HUNTER, PETER (1746-1805). A Canadian administrator and soldier, born in Scotland. He chose the army as his profession and in 1799 had risen by hard service in the Revolutionary War to the rank of lieutenant general and commander in chief of the forces in British North America. In the same year he was appointed Lieutenant Governor of Upper Canada, succeeding Gen John Graves Simcoe. He remained in office six years. He gave his military duties precedence over the civil, and in the early part of his term intrusted the government to a commission while he was absent in Quebec. On his return he aided the passage through Parliament of measures providing more equal repre-

sentation and improving trade between Upper Canada and the United States. Responsible government was not yet established, and Hunter was charged with trusting too much to the advice of an irresponsible executive, yet he strove to be just and, though occasionally misled, was, on the whole, a fair-minded and successful administrator. He died at Quebec.

HUNTER, ROBERT (?-1734). A British Colonial Governor of New York and Jamaica. He belonged to an Ayreshire family. He served on the Continent, fought at Blenheim, and rose to be a colonel of dragoons before he was made Lieutenant Governor of Virginia in 1707. The vessel in which he had sailed to the Colony was taken by the French, and he was held a prisoner, but soon was exchanged for the Bishop of Quebec. In 1710 he came to America again, this time with a shipload of persecuted German Protestants who had sought an asylum in England, and Colonel Hunter, being now Governor of New York, was able to establish them comfortably along the Hudson, though the settlement was an unending care to himself. Difficulties between royal governors and Colonial assemblies were rife even in his day and he doubtless rejoiced to return to England in 1719, but he was sent out again 10 years afterward to be Governor of Jamaica and major general of the local troops, positions which he filled most creditably until his death.

HUNTER, ROBERT MERCER TALIAFERRO (1809-87). An American politician, born in Essex Co., Va. He graduated at the University of Virginia in 1829 and after studying law at the Winchester (Va.) Law School began practicing in his native county the following year. His political career began in 1833 with his election to the State Legislature, and in 1837 he took his seat in the national House of Representatives, to which he had been elected as a Democrat. From the beginning he attracted attention by his earnest opposition to Clay's protective policy and the United States bank scheme. Re-elected to the next Congress, the Twenty-sixth, he was, although only 30 years old, chosen Speaker of the House. He was re-elected to the Twenty-seventh Congress and was defeated for the Twenty-eighth (1843-45), but was re-elected to the Twenty-ninth and served until his elevation to the United States Senate in 1847. He served as Senator until the outbreak of the Civil War, withdrew after the secession of Virginia, and was expelled in July, 1861. He was a radical States-Rights Democrat and a champion of Texas annexation, the Fugitive Slave Law, and all other legislation favorable to the slave power. As chairman of the Senate Committee on Finance for many years, he was a prominent figure in financial legislation, was the author of the low tariff of 1857, the originator of the bonded warehouse system, and one of the first to advocate civil-service reform. In 1860 he was a prominent candidate for the Democratic nomination for President before the Charleston Convention, receiving, next to Douglas, the highest number of votes. He was a member of the first provisional Confederate Congress, was Secretary of State in the Confederate cabinet for a few months in 1862, and was then chosen from Virginia a Senator in the Confederate Senate, where he served throughout the war, leading the opposition to the Davis administration in that body. In 1865 he was one of the Confederate commissioners with Alex-

ander Stephens and J A Campbell to confer with President Lincoln and Secretary Seward at Hampton Roads (See HAMPTON ROADS CONFERENCE) After the war he was Treasurer of the State of Virginia from 1874 to 1880, and from 1885 until his death collector of the port of Tappahannock, Va., but he took no part in national politics Consult M T Hunter, *A Memoir of Robert M T Hunter* (Washington, 1903), and Anderson, "Robert Mercer Taliaferro Hunter," in the *John P Branch Historical Papers*, of Randolph-Macon College, vol 11, no 2 (Ashland, Va, 1906)

HUNTER, WILLIAM (1718-83) A Scottish anatomist, the elder brother of John Hunter He was born at Long Calderwood, Lanarkshire He took up the study of theology at the University of Glasgow, but decided to devote himself to the study and practice of medicine In 1746 he was invited by a society of naval surgeons to deliver a course of lectures on operative surgery After 1748 he confined himself almost exclusively to obstetrics and became connected with the Middlesex and the British Lying-in hospitals In 1764 he became physician extraordinary to Queen Charlotte and in 1768 was appointed professor of anatomy in the Royal Academy His principal work is an *Anatomical Description of the Human Gravid Uterus and its Contents* (1783)

HUNTER, WILLIAM ALEXANDER (1844-98) A Scottish lawyer and politician He was born at Aberdeen, where he was educated in the grammar school and in the university, graduating from the latter (M A) in 1864 He was called to the English bar at the Middle Temple in 1867 and was professor of Roman law (1869-78) and of jurisprudence (1878-82) at University College, London Thenceforward he devoted himself to politics and from 1885 to 1898 was a Liberal member of Parliament, where he was a persistent advocate of old-age pensions, and where he obtained a measure establishing free elementary education in Scotland He published two well-known texts, *A Systematic and Historical Exposition of Roman Law in the Order of a Code* (1876; 2d ed., 1885) and *Introduction to Roman Law* (1880, 3d ed, 1885)

HUNTER, SIR WILLIAM WILSON (1840-1900) A British Indian administrator, scholar, and statistician, born in Glasgow Educated at Glasgow, Paris, and Bonn, he entered the Indian civil service in 1861 Eight years afterward he was transferred from Orissa and put on special duty to plan an Imperial gazetteer of British India; in 1871 he was appointed director general of statistics Ten years later after the appearance of the first edition of the *Imperial Gazetteer of India* (condensed to 9 vols in 1881), which was edited by Hunter and is one of the greatest works of reference on India, he was made a member of the Governor-General's council and in 1882 acted as president of the educational commission He retired from the service in 1887, settled at Oxford, and became a regular correspondent of the *London Times* on affairs in India. He wrote in a vigorous and picturesque style and for the most part with great scientific accuracy *Annals of Rural Bengal* (1868, 5th ed, 1872), *Comparative Dictionary of the Non-Aryan Languages of India and High Asia* (1868), which has more valuable material than original induction, as Hunter himself saw afterward, a *Statistical Account of Bengal* (1875-77), *Statistical Account of Assam* (1879),

A Brief History of the Indian Peoples (1880, and, in more expanded form, 1895, under the title *The Indian Empire*), *Life of the Earl of Mayo and Life of the Marquis of Dalhousie* (1890), *The Old Missionary* (1895), a story, a biography of his friend Brian Houghton Hodgson (1896), *The Thackerays in India* (1897), and the incomplete but valuable *History of British India* (1899-1900) Consult Skime, *Life of Sir William Wilson Hunter* (London, 1901), and W W Hunter, *The India of the Queen and Other Essays* (New York, 1903)

HUNTER COLLEGE See NORMAL COLLEGE

HUNTER'S MOON The full moon immediately following the harvest moon (q v)

HUNTING (AS *hunting*, from *huntran*, to hunt, connected with Goth *hunþan*, to seize, and probably with Eng *hand*) The pursuit of game, especially as a recreation or sport The true sportsman is a strong supporter of every law designed for the protection of game (see GAME LAWS, WILD LIFE, CONSERVATION OF) and rarely kills game for any other purpose than for eating, unless it is a dangerous creature or a nuisance Thus, an animal like the fox is hunted partly on account of its destructiveness and partly for the enjoyment to be obtained in its pursuit Hunting is a very ancient amusement, and the pursuit of game, either as a pastime or for the necessities of subsistence, has from the earliest times been one of the characteristic occupations of the human race According to tradition, Alexander the Great paid a large sum for a treatise on this subject by Aristotle, and the chase has been described by Appianus, Nemesianus, and many other classic authors

Firearms The improvement in firearms may be said to have simplified hunting to some extent, but, on the other hand, it has caused most of the hunted animals to be more wary and has made more necessary than ever the study of natural history and woodcraft by the hunter It is impossible to prescribe hard and fast rules about the choice of hunting weapons, whether for large or small game, but an inexperienced person may well consult an expert as to the "fit" of the gun he intends to buy, i e, the length of stock, "drop," weight, etc For a more detailed description of the various types of shotgun and rifle for every variety of game, the reader is referred to SHOTGUN, RIFLE, HUNTING

Dogs. A description of the various varieties of dogs used in the hunting or pursuit of game will be found under FIELD DOGS Other closely related articles are GAME PRESERVE, HORSE, HORSEMANSHIP

There are many methods of hunting, and some animals necessitate a pursuit in special ways, but the killing of game by shooting is by far the most common method and the one to which this article is largely devoted In consequence of improved methods of agriculture, shooting of birds over dogs in England and parts of Scotland and Ireland has become practically a thing of the past, and the "drive," or *battue*, wherein the game is driven past the hunter, is the common method In America dogs may be regarded as a necessity in the hunting of most game birds, excepting waterfowl Many rules have developed for the guidance of sportsmen when shooting together in the field, some of the more important of which may be mentioned Where two persons are shooting together, it is the rule

for one not to shoot at a bird which is flying towards his companion. It is very necessary to condemn the firing across a comrade's face, and good-fellowship demands that a bird should never be fired at if it is flying so that it must cross before a companion until he has failed with both barrels of his gun. Where the birds fly directly away from the sportsmen, shots are taken at them alternately unless several should rise at once, when it is permissible for each man to fire at the birds on his own side.

Kinds of Game. *Snipe* first appear in spring and are usually found in meadows and salt marshes. Windy weather, if the wind is not too high, is a favorable time. Among expert gunners the jacksnipe (Wilson's snipe) is a great favorite, owing to its swift and erratic flight. *Woodcock*.—During the day these birds may be found seeking for food in marshy thickets. When flushed, they fly in a rising straight line as far as the top of the bushes, and then, after making some little distance horizontally, they settle down by means of a number of quick zigzag movements. *Grouse*.—The two most important varieties are the ruffed grouse (generally called partridge in the Northern States, though locally known as the pheasant) and the pinnated grouse, or prairie chicken, now nearly extinct. In common with the Canada grouse (spruce partridge) and the blue and sharp-tailed grouse of the West, they have stout bills, short feathered legs, and dark plumage. The partridge is found in thick woods and is greatly protected by its color, which is so much like that of the ground that the bird is frequently overlooked. It is very shy and wild and frequently will run far ahead of the dogs and eventually rise completely out of range. Sometimes they are hunted with dogs and shot after they have taken refuge in a tree, but the keen sportsman never shoots unless he can secure them on the wing. The ruffed grouse is the most cunning game bird to be found in the Northern States. The *Quail* is often called partridge in the Southern States and is popularly known as the bobwhite. There are many species and subspecies of the bird, all of about the same size, though the plumage of the Eastern and Western forms differs greatly. They are found in the Eastern and Middle States but are more abundant in the South and Southwest. They afford good sport and are more easily got at than grouse or woodcock. They are usually hunted with dogs and make a very swift flight. *Wild Fowl* (in which general description are included swans and geese, and among the ducks canvasbacks, black ducks, red-heads, mallards, teal, pintail, and wood duck) abound especially along the New Jersey coast, Delaware and Chesapeake bays, Currituck Sound, the Mississippi valley, Puget Sound, the Willamette and Columbia rivers. They are very fond of wild rice and wild celery and are frequently lured to waters in which they have no natural food by hunters who plant wild rice. They are hunted in a variety of ways, among which may be enumerated the following. The hunter may station himself concealed near a point over which they fly and shoot them as they pass, or he may put out decoys (see *Decoy*), or he may steal upon them while they are feeding or resting. In the Chesapeake Bay particularly, and occasionally elsewhere, sink boats are used, in which the gunners lie and shoot the birds as they fly over. Another method is to sink a box in the

sand or shallow water in which the hunter lies as in a sink boat. Another very successful way is to employ the trained Chesapeake Bay dog, which will run up and down the shore and by its actions excite the curiosity of the birds, which, if they approach to satisfy their curiosity, are within easy range of the gun. This method is known as *tolling*. *Wild Turkeys* are hunted with or without a decoy call or whistle. They are easily tracked by their trail on the ground and may be shot at their roosts if surprised at break of day. The *Rail* is usually hunted from boats at flood tide—a method which demands considerable skill and experience on the part of the man who manipulates the boat. *Hunting the hare* with beagles is a very popular sport in England, partly for the exercise it affords and partly for its economy, in that horses are not required.

Ammunition. For a discussion of rifle ammunition, see the articles *RIFLE*, *HUNTING*, *SMALL ARMS*. In the article *SHOTGUN* the modern tendency to discard large-bore guns for those of smaller bore is noted, and the following suggestions are made with due regard for that tendency. Many sportsmen make the mistake of using too small shot whatever the game they are hunting. This is done under the generally mistaken impression that a thick cloud of small shot is more likely to prove deadly than a thinner cloud of larger shot. It should be borne in mind, however, that small shot has several distinct disadvantages. In the first place, at comparatively short ranges the body of the bird or animal may be struck by from six to a dozen of the smaller pellets, which are likely to interfere seriously with the pleasure of eating the creature, whereas two or three of the larger pellets would have brought down the game, and in at least some instances would have passed clear through the body. Again, small shot necessarily loses its momentum much sooner than a larger size, so that at comparatively long ranges it might fail to inflict wounds which kill or cripple at once, with the result that the game may escape to die of its wounds. Many experienced gunners therefore advocate the use of the largest shot that will make a cloud which at the normal range will be dense enough to make it impossible for the animal to escape being hit at least two or three times, if the gun be held true.

From this point of view the following suggestions are made as to the size of shot to be used for certain game: partridge (grouse), No. 4 or 5, woodcock, No. 7 or 8, quail, No. 6 or 7, rail, No. 6 or 7, snipe, No. 7 or 8, teal and other small ducks, No. 5 or 6, mallard black duck, and others of similar size, No. 2 or 3 (or even No. 1), geese and brant, No. 1 or BB, turkey, BB, squirrel, No. 4 or 5, rabbits, No. 4 or 5, hare, No. 1 or 2, etc. Three and a half diams of smokeless powder to an ounce and an eighth of shot is an adequate normal load for a gun of 12 bore, though this may well be increased slightly if geese, brant, turkey, or other large and hardy birds are the game. The great bulk of the shotgun ammunition now used is "factory loaded," in paper shells which are not reloadable, and the product is usually quite reliable.

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HUNTING BIG GAME The term "big game" is an elastic one, but may generally be understood to include all wild mammals larger than the common fox. The establishment of game preserves (see **GAME PRESERVE**) in Africa and America and the enforcing of stringent game laws, especially such as protect female animals at all times, have done much to conserve these species, but even with such protection rigidly enforced, the only large wild mammal not in danger of extermination is the polar bear, whose habitat in the Arctic is unlikely to be invaded by hunters in numbers sufficient to menace its existence.

Africa. The characteristic big game animals

of Africa are the lion, leopard, and cheeta of the cat tribe, the elephant, rhinoceros, and hippopotamus among the pachyderms, the buffalo of the Bovidae, some 30-odd large species of antelope, and the zebras.

There is no unanimous agreement among sportsmen as to what big game (including, for the moment, the tiger) is most dangerous to hunt. As to the African animals, Frederick Courteney Selous, one of the most skillful and successful of contemporary hunters (and an accurate observer as well), places the lion first, the buffalo and the elephant about on a par, and the rhinoceros last. Sir Samuel Baker put the elephant first, followed by the rhinoceros, buffalo, and lion. Many hunters insist that the buffalo is the most determined and vicious of all the mammals, once he has really begun to fight. Col Theodore Roosevelt says "on the whole it seems to me that the weight of opinion among those best fitted to judge is that the lion is the most formidable opponent of the hunter, under ordinary conditions. This is my own view" (*African Game Trails*, p 64). As to the tiger, though there can be no difference of intelligent opinion concerning the animal's great ferocity, courage, and vitality, experienced hunters say that it is rather less likely, than is the lion, to break cover and make a determined charge in plain sight. Colonel Roosevelt and other hunters are agreed, however, that the leopard, though naturally less dangerous than the lion or the tiger because of its smaller size, shows all of the ferocious courage of its larger relatives, and even more extraordinary vitality.

There are various methods of hunting the lion. One is to lie in wait for the beast near one of its fresh, but only partly devoured, kills in the hope that it will return for another meal, or the hunter may attempt to bait the lion by means of a dead animal or a living one tethered, or he may lie in wait at a water hole known to be frequented by lions. All of these are unsatisfactory, since each is likely to involve a long wait, with the probability that the lion will detect danger and make off, also on account of the difficulty of shooting in the dark. The most common method is to hunt for the spoor of the beast and drive him from his hiding place.

Though naturally a nocturnal animal, lions are frequently found on the plains in daylight, usually when returning to their cover in the early morning or starting out, in the late afternoon, for their night hunt. Under these circumstances a lion will generally shuffle away, even if he sees he is being pursued, but when pressed close or angered by shots he is almost certain to come to bay and charge with the utmost determination and ferocity. The hunter must stand his ground and shoot accurately and rapidly as long as the animal shows the slightest sign of being able to advance. This shooting is not likely to be very difficult, since a charging lion usually does not come on at a bound, but at a very rapid gliding pace, with its body quite close to the earth. If the hunter attempts to escape, it is practically certain that the lion will overtake and kill him outright or inflict wounds with its teeth and claws from which violent and usually fatal septic poisoning ensues.

Paul J Ramey (qv), the American sportsman, made a remarkable demonstration in 1911 of the efficiency of trained dogs in lion hunting. He took with him to Africa about 30 tracking

and fighting dogs. There he trained the tracking dogs to follow the trail of a lion until the animal was at bay, when the fighting dogs would come up and worry the beast, keeping out of its reach meanwhile, until the hunters arrived. Tracking and actually stalking the animal in the jungle or other thick cover, and killing it at close quarters, is sometimes accomplished, but this method is regarded as generally little less than foolhardy.

Any modern repeating rifle, using ammunition loaded with high-power smokeless powder and an expansive or soft-nosed bullet, of from about 0.35 to about 0.40 calibre, will be found effective in shooting soft-skinned animals like the lion, leopard, or tiger.

Elephant hunting is considered little, if any, less dangerous than the pursuit of the lion, and even more difficult, because of the necessity generally of following the great beasts into jungle growths. So dense are such growths that the hunter frequently cannot see clearly for 20 feet in any direction excepting along the trail he is following. As the animals' hearing and sense of smell are very acute, it is necessary to approach cautiously upwind, and not infrequently to within 25 or 30 yards, before a fair shot can be obtained. The only shot which is certain to kill the animal outright is one which penetrates the brain, and if the elephant's head is seen from the side—the more favorable position—the mark presented is a space only about seven inches long by three inches wide, lying roughly between the eye and the ear. Any shot not instantly fatal is very likely to provoke a charge by the wounded animal. It is dangerous to attempt a frontal head shot at an African elephant, as the brain cavity is protected to some extent by the tusks, which are set much more deeply into the skull than are those of the Indian elephant, and a heart shot is not likely to stop one of these great beasts when he charges at close quarters. A bullet through the brain from a small calibre rifle will kill an elephant instantly, but because of the difficulty of hitting that organ unless the animal's head is fully exposed, elephant hunters generally use a rifle of comparatively large calibre (0.40 or more), and always a full metal-jacketed bullet, the soft-nosed bullet being ineffective against all of the pachyderms. Many elephant hunters prefer the double-barrel rifle to the repeater, because with it a second shot may be fired much more quickly than with any single-barrel magazine weapon which must be loaded after each shot.

Rhinoceros hunting is usually much less difficult than is elephant hunting, because the animal is likely to be found in the open, and on account of its poor eyesight may generally be approached (unless it is warned by the tick birds) upwind to within easy shooting distance. The rhinoceros is naturally an aggressive and exceedingly truculent animal, and is very likely to charge the hunter most savagely once it discovers him. Despite the beast's great bulk, it gets under full headway—which is no mean pace—with astonishing celerity, and must be hit very hard in a fatal spot before it can be stopped. The animal's brain is so small, and so well protected by the formation of the skull and from the front by its horns, that the hunter usually is obliged to depend upon the fore shoulder or the heart shot.

Apparently all hunters are agreed as to the vicious disposition of the African buffalo and the blind courage and persistence of the animal's charges. The danger of hunting the animal is increased by its great bulk and strength, which enable it to move very rapidly in the dense and deep papyrus swamps which it frequents, and by its thick horns, which often join in great bosses over its forehead, giving protection to its brain. Many hunters have been killed by charging buffalo, and in some districts they become so aggressive that they attack both natives and white men without provocation. Powerful rifles, like those employed in elephant hunting, must be used in the pursuit of the buffalo.

Hippopotamus hunting is comparatively dull sport, as the animals are usually shot through the head while they are floating on the surface of still water. Occasionally an animal will charge the boat bearing the hunters or dive and rise under it, but as a rule the animal is killed with little peril to its pursuers.

Little need be said about the hunting of the various African antelope, most of which are very timid. The larger species, like the roan and the sable when wounded or at bay, will sometimes turn on the hunter and become dangerous because of the skill with which they can use their long and taper-like horns. Even the big and somewhat stupid gnafie must be approached with caution if it is crippled or shows fight, for it is very quick and expert at kicking with both its fore and its hind legs. The hunting of these animals usually involves mere skill in stalking, with the element of danger generally absent.

Asia. The characteristic big game animals of Asia are the tiger, leopard, elephant, rhinoceros, buffalo, several species of bears, and numerous species of goats and deer. A few lions occur in certain districts of Persia, Mesopotamia, and Guzerat. Tiger hunting is the distinctive big-game pursuit of the continent. In India usually one of two methods is employed: either the animal, having been discovered in the jungle is driven to the hunters by native beaters, or is dislodged by a line of elephants specially trained for this purpose and carrying the sportsmen. When native beaters are used the hunters usually occupy platforms built in trees at a safe distance from the ground. The attempt to bait a tiger to within shooting distance by means of a tethered animal is no more likely to be successful than is the same method when employed in hunting lions.

Leopards are commoner than tigers in Asia, but they are even more difficult to hunt, because they are much harder to drive out of their cover.

The Indian elephant is not so large as the African species and is more easily killed, because its tusks do not protect the brain cavity in the manner peculiar to the African animal, and therefore it may be shot from the front as well as from the side. The three species of rhinoceros in Asia are widely distributed, occurring in Assam, Burma, Siam, Sumatra, and Borneo. As the animal is usually found in marshes covered by heavy and tall grass, it is commonly hunted from elephants. More exciting is the hunting of buffalo in the forests of Burma and India. The animal is apparently less aggressive than its African relative, but when wounded it has a trick of lying in wait for the pursuing

hunter and dashing out on him in an attempt to take him unawares. The pursuit of wild goats and sheep which frequent the high mountain ranges requires great exertion and skill in mountain climbing, while the shooting is often done at long range.

America The big-game animals of North America are the bears, the musk ox, many representatives of the deer family, the mountain sheep and goats, the pronghorn antelope (now fast disappearing), the jaguar, the puma or mountain lion, and the lynx of the cat family, and the wolves.

Of the carnivores the bears are the most hunted, excepting the polar bear, which, for reasons already mentioned, is comparatively free from molestation. Polars are usually taken on ice floes or islands to which they resort for their food. When angered by pursuit or when wounded, this bear is quite likely to turn on the hunter, and then becomes a dangerous antagonist.

The Alaskan brown bear group includes the great Kodiak bear, which is by far the largest of the existing carnivores and probably often exceeds a weight of 1200 pounds. These bears live chiefly in the mountain fastnesses and are most frequently seen and shot along the streams to which they resort in the spring to catch salmon. Thus engaged they are likely to become much absorbed, and may sometimes be approached within shooting distance. Powerful rifles (though not necessarily of very large calibre) firing soft-nosed bullets should be used in hunting this huge beast.

There can be no doubt that the grizzly bear's temper has undergone a great change since he first came into contact with civilized man. The early explorers and frontiersmen have left records which show that in their day the grizzly was naturally ferocious and quite disposed to take the aggressive upon slight or no provocation. To-day the animal seems inclined to make off at full speed the instant it suspects the presence of man. It does this so promptly that even in a bear country probably 10 will make a complete and unseen escape where one will be seen. A she bear with cubs is likely to become aggressive if she sees a hunter near by, and any grizzly, if wounded or at bay, is likely to make a stand or even to charge. But even in the latter event two animals may act in a totally different manner, one turning back if shot, or stopping to whine and bite at the wound, while the other may come on with the most determined ferocity, and though badly wounded, may continue to charge until it is killed or succeeds in knocking down the hunter. In the charge one may simply bowl a man over by a single blow and then retreat, another may be satisfied by giving the hunter two or three bites when he is down, and a third may lie on its victim and deliberately bite him to death.

The black bear is a much smaller animal than the grizzly and correspondingly less dangerous, though it could easily overpower and kill a man. It is a comparatively timid beast and seldom shows fight if it can see a way of escape. Unlike the grizzly, which does not climb trees, the black bear is a skillful climber and is apt to adopt that method of escaping from dogs, thereby making it easy prey for the hunter.

The jaguar, which rarely occurs north of Mexico, is not only the largest and most powerful of the cat family in the Western Hemi-

sphere, but ranks next to the tiger in size and strength. It is lacking in the aggressiveness and courage of its Asiatic and African relatives, and when pursued by dogs usually soon takes to a tree, where it is easily shot. The puma or cougar, also called mountain lion, is the most widely known of the cat tribe in North America and is also common in Central and South America. It is an active and handsome animal, but an arrant coward, and like the jaguar promptly takes to a tree when it is chased by dogs.

Of the Cervidæ family in America, the moose is probably the most interesting from the hunter's point of view. It is taken commonly by calling, by still-hunting, or by tracking. In the first-named method the bull is attracted (during the breeding season) by imitating the call of the cow, on a megaphone-like horn, usually made of birch bark. Upon hearing this call the bull usually answers—sometimes from a distance of a mile or more—by a short, deep grunt, and then comes on, as a rule very slowly and quietly, making détours in an endeavor to get the scent of the hunter, for apparently the animal always suspects that he is being deceived. Despite its huge bulk and weight and its widespread antlers, it frequently makes this advance, even through a dense forest, so noiselessly that it may approach to within 40 or 50 yards before its presence is discovered. An old and pugnacious bull will sometimes challenge as he draws near, and if the cow's call is then repeated, the animal may come on at a run, roaring and battering its antlers against the tree trunks, apparently for the purpose of intimidating any other bull which may be in the vicinity. Still-hunting the moose involves stealthy walking and watching in the forests which the moose are known to frequent, while tracking is usually practiced after a fall of snow. The animal is also frequently shot from a canoe, when it comes to a river or lake to drink or feed. The moose seldom turns on a hunter, but a wounded animal should always be approached very cautiously.

Elk hunting offers considerably less variety than the pursuit of the moose and is a less difficult operation, especially during the breeding season, when the bulls frequently betray their whereabouts by their loud and repeated challenging. This animal is protected in nearly all parts of its natural range within the United States. The caribou is a rather dull animal, which usually may be approached upwind quite easily, so that its hunting rarely requires much skill or manoeuvring.

The hunting of mountain sheep probably puts to a severer test the hunter's skill than does the pursuit of any other American game. The animal is apt to be found high up in lofty mountains, and to get within shooting distance is likely to involve much hard and dangerous climbing. The mountain goats are found in the same sort of places and are thought by some hunters to be even more sure-footed than the sheep, but they are much less alert and intelligent.

The methods of hunting the various smaller deer require no special description. All are taken chiefly by still-hunting in the daytime. The white-tailed deer is the most numerous and the most widely distributed, it is very intelligent, always alert, and exceedingly swift of foot, so that still hunting it successfully requires stealth, patience, knowledge of the animal's

habits, and quick and accurate shooting. That the animal is still to be found in practically every State in the United States, despite the fact that it is hunted virtually everywhere during an open season, is sufficient proof of its cleverness in eluding its chief enemy.

For a list of works on hunting big game, see the bibliography appended to HUNTING. See also RIFLE, HUNTING, LASSO.

HUNTING CAT, or **HUNTING LEOPARD** See CHEETA

HUNTING DOG This interesting animal (*Lycaon pictus*), which inhabits all the more open parts of Africa south of the Sahara and Abyssinia, is an aberrant species of dog, distinguished from the typical *Canis* by having four toes on each foot and other structural peculiarities. It is about as tall as a greyhound, its legs being relatively long and slender and adapted to the swift and enduring speed upon which it must depend for a livelihood. The head is broad and flat, with a short muzzle armed with massive teeth, rather large upstanding furry ears, and a suggestion of the hyena in the physiognomy, hence it is sometimes called hyena dog, though the likeness (even to the spotted hyena) is wholly superficial. (See Plate of WOLVES AND WILD DOGS with WOLF.) The fur is short, thick, and smooth, and grows more shaggy about the cheeks and throat, and the tail is long and wolflike. In general color this dog is yellowish gray, but it is marked most irregularly with a variety of colors, such as a combination of red, white, yellow, and black spots, so that the hyena dog may be regarded as the most parti-colored of all mammalia. In the southern Sudan, where the animals are plentiful, Schweinfurth saw one specimen that was perfectly tame, required no other restraint than a cord, and yielded to its master with all the docility of an ordinary dog. This fact appears to corroborate the assertion of Livingstone that the natives of the Kalahari Desert are accustomed to break in this animal and train it for the chase.

To the Africans generally, however, both white and black, the hyena dog was one of the most truly wild and dangerous animals of the country, taking the place of the wolves of the northern part of the world. They gathered into packs and astonished and terrified the early settlers and explorers by their numbers, audacity, and strange cries. They frequented mostly plains and scantily forested or brushy regions, where the small antelopes abound, which were their principal prey, and which they would pursue in concert, often only two working together, until the baffled victim (often of the larger species) was cornered or exhausted and might be pulled down. They were a terrible scourge to the sheep and goats of the early frontier farmers and killed or mangled many more of the flock in one of their nocturnal forays than they could possibly eat. The war waged against them in consequence and the diminution of the wild game have caused a great decrease in their numbers, but numerous bands still range the wilds of East and Central Africa and the deserts west and north of Cape Colony. Consult, for early history of the animal, the books of Livingstone, Gordon-Cumming, Moffat, Harris, and their contemporaries, and for later facts, G. Schweinfurth, *Heart of Africa* (trans. 2 vols., London, 1878), F. C. Selous, *A Hunter's Wanderings in Africa* (1b, 1890, New York, 1911), Richard Lydekker, *The Game Animals of Africa* (Lon-

don, 1908), and especially Roosevelt and Heller, *Life-Histories of African Game Animals* (New York, 1914). See DOG.

HUNTINGDON A municipal borough, capital of Huntingdonshire, England, on the Ouse, 59 miles north of London (Map England, F 4). It is celebrated as the birthplace of Oliver Cromwell, the entry of whose birth is to be seen in the register of St John's Church under the year 1599. The grammar school, founded in 1260, where he and Samuel Pepys were educated, has been restored. The town has a race course at which meetings are held each August. Of Saxon origin, the town was the seat of a royal castle built in 919. Huntingdon received its charter of incorporation in 1189. A fine bridge erected in the thirteenth century connects it with Godmanchester. It is presided over by a mayor, 4 aldermen, and 12 councilors. Pop, 1901, 4261, 1911, 4003.

HUNTINGDON. A borough and the county seat of Huntingdon Co., Pa., on the Juniata River, 98 miles west of Harrisburg, on the Pennsylvania and the Huntingdon and Broad Top Mountain railroads (Map Pennsylvania, F 6). It is the seat of Juniata College (Church of the Brethren), opened in 1876, and of the State Industrial Reformatory, and it contains a hospital. The city is in an agricultural and fruit-growing region, with valuable forests and deposits of iron, coal, fire clay, and limestone, and has manufactures of flour, machinery, radiators, furniture, stationery, woolen goods, lumber, etc. Huntingdon was settled about 1760 on the site of a famous Indian council ground, now marked by a "Standing Stone Monument," erected at the borough centennial. The government is administered under the original charter of incorporation, adopted in 1796, which provides for a chief Burgess, chosen every three years, and a council elected at large. Pop, 1900, 6053, 1910, 6861.

HUNTINGDON, HENRY HASTINGS, third EARL OF (1535-95). An English noble, leader of the Protestant party, son of Francis Hastings, the second Earl, whom he succeeded in 1561. He was an intimate of Edward VI who knighted him in 1548, and, through his mother's descent from George, brother of Edward IV, he claimed after Elizabeth the succession to the crown. Especially in 1562, during her severe illness, he was considered as her probable successor. He hotly opposed the scheme to marry Mary Stuart to Norfolk and was intrusted by Elizabeth to see that the Scottish Queen did not escape at the time of the threatened uprising in 1569. In the same year he was one of the council which considered the evidence against Mary, helped try Norfolk in 1573, and was prominent and active in the preparations of 1588 for the Spanish invasion. Huntingdon was a zealous Puritan in sympathies, possibly for political reasons. He was succeeded by his brother George.

HUNTINGDON, HENRY OF See HENRY OF HUNTINGDON.

HUNTINGDON, SELINA HASTINGS, COUNTESS OF (1707-91). One of the most influential promoters of the early Methodist movement. She was the second of three daughters of Washington Shirley, second Earl Ferrers, and was born at Stanton-Harold, Leicestershire, Aug. 24, 1707. She married, in 1728, Theophilus, ninth Earl of Huntingdon. She adopted the principles of the Methodists, much to the dismay of her friends, and gave her life with increasing zeal,

especially after the death of her husband, in 1746, to the interests of the new sect, introducing its ideas into aristocratic circles, to which its other adherents had no access. She was an intimate friend of both Wesleys, of Whitefield, and of many other clergymen prominent in her time. In the dispute between the Wesleys and Whitefield she sided with the latter and assumed a leadership among the Calvinistic Methodists, who came to be known as "The Countess of Huntingdon's Connection." For the education of ministers she established and maintained a college at Trevecca in Wales (removed, in 1792, to Cheshunt, Hertfordshire, and in 1905 to Cambridge), and built or became possessed of, over 60 chapels in different parts of the country, the principal one being at Bath. She likewise expended large sums in the support of young men trained to itinerant preaching as well as in private charity. She died in London, June 17, 1791. By her will she created a trust bequeathing her chapels to four persons for their care and management after her death. Consult *Selina, Countess of Huntingdon*, by a member of the houses of Shirley and Hastings (2 vols., London, 1839-40), A. H. New, *The Coronet and the Cross, or, Memorials of Selina, Countess of Huntingdon* (ib., 1857), Abel Stevens, *Women of Methodism* (New York, 1866), Sarah Tytler (pseud.), *Countess of Huntingdon and her Circle* (ib., 1907).

HUNTINGDONSHIRE. An east-midland county of England, bounded on the east by Cambridgeshire, on the south by Bedfordshire, and on the west and north by Northamptonshire. Area, 365 square miles, almost the whole of which is in arable or pasture lands (Map England, F 4). Pop., 1901, 54,125, 1911, 55,577. It is watered chiefly by the Ouse, the Nene, which skirts its northern boundary, and the Kym. The northern portion of Huntingdonshire is included in the great fen country called Bedford Levels. The soil is various, clay, however, predominates generally. Grain, beans, peas, mangold, cabbage, rape, and clover are the chief crops. Its dairy products are well known, bee farming is engaged in, and cattle are raised. There are manufactures of paper, parchment, brick, and tile. Capital, Huntingdon. Consult W. M. Noble, *Huntingdonshire* (New York, 1911), with maps, diagrams, and illustrations.

Huntingdonshire was traversed by two Roman roads, and Roman remains, as coins, pottery, etc., have been found. In early Anglo-Saxon times it belonged to East Anglia, afterward to Mercia.

HUNTING LEOPARD. See CHEETA.

HUNTINGTON. A city and the county seat of Huntington Co., Ind., on Little River, 24 miles southwest of Fort Wayne, on the Wabash, the Cincinnati, Bluffton, and Chicago, and the Erie railroads (Map Indiana, G 3). It has a United Brethren college, a business college, county hospital, courthouse (costing \$350,000), fine city hall, and a public library, which contains a fine collection of Indian relics. There are railroad shops of the Chicago and Erie, numerous limekilns and woodworking establishments, and manufactures of boots and shoes, pianos, gloves, railroad cranes, clamshell buckets, cedar chests, furnaces, etc. The city has no trolleys and is one of the first cities in the world to operate an extensive system of automobile transit cars. Settled in 1834, Huntington was incorporated as a town in 1848 and in 1873 was chartered as a city. Under a statute of

1905 the government is vested in a mayor, elected quadrennially, and a city council. The water works and electric-light plant are owned and operated by the municipality. Pop., 1900, 9,491, 1910, 10,272, 1914 (U. S. est.), 10,479. Huntington was the scene of important activities in connection with the Knights of the Golden Circle (q.v.).

HUNTINGTON. A town, including several villages in Suffolk Co., N. Y., on Long Island Sound, 35 miles east by north of New York City, on the Long Island Railroad. It is in a fertile agricultural district and is primarily a residential suburb of New York and a popular summer resort. There is a public library, and a monument marks the spot where Nathan Hale the patriot spy was captured. A State fish hatchery and a biological school are situated here. The government is administered by town meetings, which are held biennially. Pop., 1900, 9,483, 1910, 12,004. Consult H. C. Platt, *Old Times in Huntington* (New York, 1876), Silas Wood, *Sketch of the Town of Huntington* (ib., 1898), Peter Ross, *History of Long Island* (ib., 1903), B. F. Thompson, *History of Long Island* (2 vols., ib., 1909).

HUNTINGTON. A city and the county seat of Cabell Co., W. Va., on the Ohio River, 20 miles east of Ironton, Ohio, on the Chesapeake and Ohio and the Baltimore and Ohio railroads (Map West Virginia, B 3). It is picturesquely situated and well laid out and has Marshall College (State normal school), the West Virginia Asylum for Incurables, a fine high-school building, and a Carnegie library. The city controls an important commerce, carries on a trade in coal, iron, and lumber, and has several wholesale establishments, shops of the Chesapeake and Ohio Railroad, large car works and foundry, a steel plant, machine shops, light-rail mill, a brewery, and manufactures of glass and china, furniture, picture frames, stoves, etc. Settled and incorporated in 1871, Huntington has adopted the commission form of government. The growth of the city has been rapid. Pop., 1900, 11,923, 1910, 31,161, 1914 (U. S. est.), 41,615.

HUNTINGTON, ARCHER MILTON (1870-) An American Hispanic scholar, adopted son of Collis P. Huntington. Born in New York City, he was educated there and in Spain. In 1898, for the Spanish government, he conducted important excavations on the site of the old Roman city of Italica, near Seville. The American Geographical Society and the American Numismatic Society chose him then honorary president. To the Hispanic Society of America, which he founded in 1904 and of which he became president, he gave a home in New York, an endowment, and rich collections, and in 1915 he gave jointly to the Academy and the Institute of Arts and Letters a site near the Hispanic, Numismatic, and Geographical societies. He received honorary degrees from Yale, Harvard, and Columbia. He edited *The Poem of the Cid* (3 vols., 1897), *Lady Aulmoy's Travels into Spain* (1899), with introduction, and several other Spanish texts, contributed to magazines, and is author of *A Note Book in Northern Spain* (1898) and *Sonnets* (1908).

HUNTINGTON, COLLIS POTTER (1821-1900). A pioneer American railroad builder, born at Harwinton, Conn., Oct. 22, 1821. Of a noted New England family, Collis P. Huntington early gave evidence of business initiative

—at 15 he started life peddling clocks in the South and West. In 1848 he went out to California and set up as a hardware merchant in Sacramento. With Charles Crocker, Mark Hopkins, and Leland Stanford he laid plans in 1859 for building the Central Pacific Railway, and credit for the completion of this work (1869) is due largely to Huntington's enterprise as fiscal agent for the group. Later, with his associates, Huntington built the Southern Pacific (completed 1881) and the Chesapeake and Ohio railroads, and in time he came to operate 44 branches or connecting railroads along continuous lines from Portland, Ore., via San Francisco and New Orleans to Newport News, Va. The Southern Pacific, of whose board of managers Huntington was president, also acquired large interests in steamship lines. (See RAILWAYS, *History*.) Especially interested in Indian and negro education, he gave liberally to Hampton and Tuskegee institutes, as a memorial to his mother he built a Congregational church in his native town, and to Westchester, N. Y., he presented a library. At the time of his death (which occurred at his camp in the Adirondacks, Aug. 13, 1900) Mr. Huntington possessed a fortune estimates of which ranged from \$35,000,000 to \$80,000,000. By bequest he left to the Metropolitan Museum, New York, Peale's portrait of Washington, and his \$3,000,000 collection of paintings as a whole he also bequeathed to this museum, the bequest to take effect after the death of his widow and his adopted son, Archer M. Huntington (qv). Besides other large benefactions, Mrs. Huntington in 1909 made a gift of \$750,000 to the American Geographical Society.

HUNTINGTON, DANIEL (1816–1906) An American historical, genre, and portrait painter. He was born in New York, Oct. 14, 1816, and was educated at Hamilton College. In 1835 he studied with Professor Morse and later with Inman, in 1839 he visited Italy, studying with Ferriero in Rome. He was elected member of the National Academy in 1840 and held the office of president from 1862 to 1869 and from 1877 to 1891. He was talented, of fine mind, and industrious, but unfortunate in his early environment and in his epoch—artistic taste in the United States was then at its lowest ebb.

His color is subdued but good, his style is unaffected, and, as the years passed, his technique improved greatly, showing that he was in touch and sympathy with new movements in art. He was chiefly engaged in portrait painting, but also produced historical and genre works of note. Two of his largest canvases are "Lady Washington's Reception Day" and the "Atlantic Cable Projectors," in the Chamber of Commerce, New York. Other works are "Florentine Girl" (1839), "Henry VIII and Catherine Parr" (1850), "Venice," owned by J. P. Morgan, New York, "Study in the Woods," owned by Mrs. C. P. Huntington, New York, "The Sibyl," Historical Society, New York, "Republican Court" (1876), Stuart collection, New York. Among his portraits are those of President Lincoln, Union League Club, New York, Gov. E. D. Morgan, New York University, Bishop Potter, Judge Blatchford (1879), United States District Court, New York, Rev. Dr. Adams (1883), Union Theological Seminary, New York, Hon. R. C. Winthrop, United States Congress. In the Metropolitan Museum,

New York, are his "Mei-y's Dream" and portraits of John David Wolfe, Cyrus W. Field, William C. Prime, and Mrs. Elizabeth U. Coles. Consult S. G. W. Benjamin, "Daniel Huntington," in *American Art Review*, vol. 11 (Boston, 1881).

HUNTINGTON, ELLSWORTH (1876–) An American geographer and explorer, born at Galesburg, Ill. Educated at Beloit College and at Harvard and Yale, he taught (1897–1901) in Turkey, became a research assistant in the Carnegie Institution, Washington, and after 1907 was instructor and then assistant professor at Yale. He participated in the Pumpelly expedition to Russian Turkestan (1903–04), in the Barlett expedition to Chinese Turkestan (1905–06), and in an expedition to Asia Minor (1909). Honors came to him from foreign geographical societies. His writings include *Explorations in Turkestan* (1905), *The Pulse of Asia* (1907), *Palestine and its Transformation* (1911), *Asia—A Geography Reader* (1912), *The Climatic Factor as Illustrated in And America* (1914).

HUNTINGTON, FREDERIC DAN (1819–1904) An American clergyman, the first Protestant Episcopal Bishop of central New York. He was born at Hadley, Mass., graduated at Amherst in 1839 and at Harvard Divinity School in 1842, and was pastor of the South Congregational (Unitarian) Church, Boston. In 1855 he became preacher at Harvard and Plummer professor of Christian morals there. In 1860 he left the Unitarian church to become an Episcopalian. Resigning his professorship, he organized a parish in Boston and was its rector until 1869, when he was consecrated Bishop of the newly created diocese of central New York. He then settled in Syracuse, where he remained until his death. Among his numerous works are *Lectures on Human Society* (1860), *Christ in the Christian Year* (2 vols., 1877–81), *The Golden Rule Applied to Business and Social Life* (1892). Consult Anna S. Huntington (his daughter), *Memoir and Letters of Frederic Dan Huntington* (Boston, 1906) and *Dootor Huntington Being Editorials from the Living Church, Sept. 4–11, 1909* (New York, 1909).

HUNTINGTON, HENRY OF See HENRY OF HUNTINGTON.

HUNTINGTON, JEDEDIAH (1743–1818) An American general in the Army of the Revolution, born in Norwich, Conn., the son of Jabez Huntington (1719–86). He graduated at Harvard in 1763, joined the American army at Cambridge, became a brigadier general in 1777, and took part in many important engagements until the close of the war, when he was brevetted major general in 1783. He was one of the organizers of the Society of the Cincinnati. He became collector of the port of New London in 1789 and held the office 26 years. In 1778 he was a member of the court-martial that tried Gen. Charles Lee and in 1780 of the one that condemned Major André.

HUNTINGTON, LUCIUS SETH (1827–86) A Canadian statesman. Born at Compton, Quebec, he studied law at Shebrooke and was called to the bar in 1853. He was a Liberal member of the Canada Legislative Assembly (1861–66), Solicitor-General for Lower Canada (1863–64), and member of the House of Commons (1867–82). The charges which he made in the House, for the Liberals, of a corrupt political bargain between Sir John A. Macdonald and Sir Hugh Allan (qv) in regard to the Cana-

dian Pacific Railway charter, aroused angry debate and country-wide party strife and effected a return of the Liberals to power in 1873. Huntington served as President of the Council in 1874-75 and as Postmaster-General in 1875-78. He published a political novel, *Professor Conant* (1884).

HUNTINGTON, SAMUEL (1732-96) An American lawyer and signer of the Declaration of Independence. He was born at Wyndham, Conn., on a farm, educated himself for the law, practiced at Norwich, represented that constituency in the General Assembly from 1765 to 1774, and became associate justice of the Superior Court (1774), of which, 10 years later, he became Chief Justice. From 1776 to 1784 he was a member of the Continental Congress, of which he was President, as the successor of John Jay, in 1779-80. From 1786 to his death Huntington was Governor of Connecticut—His nephew and adopted son, **SAMUEL HUNTINGTON** (1765-1817), graduated at Yale in 1785, was admitted to the bar in 1793, and in 1801 removed to Cleveland, Ohio. He passed the rest of his life in that State and held the offices of judge of the Superior Court, Chief Justice of the Supreme Court, State Senator, and Governor of the State from 1808 to 1810.

HUNTINGTON, WILLIAM EDWARDS (1844-) An American university dean and president. He was born at Hillsboro, Ill., served as private and first lieutenant in the Wisconsin Infantry in 1864-65, and was educated at the University of Wisconsin (A.B., 1870) and at Boston University (B.D., 1873, Ph.D., 1881), where he was dean of the College of Liberal Arts from 1884 to 1904, president of the university in 1904-11, and dean of the graduate department after 1911. In early life he was a Methodist minister, having been ordained in 1868, and he held pastorates in Massachusetts at Nahant (1870-71), Roslindale (1872-74), Newton (1875-76), Cambridge (1877-79), and Boston (1880-82).

HUNTINGTON, WILLIAM HENRY (1820-85). An American journalist, born at Norwich, Conn. He was in Paris as correspondent of the *New York Tribune* for 20 years, from 1858. His philanthropic work during the siege of Paris (1870-71) was important. He bequeathed his collection of medals, bronzes, porcelains, miniatures, engravings, and prints relating to Washington, Lafayette, and Franklin, to the Metropolitan Museum, New York.

HUNTINGTON, WILLIAM REED (1838-1909). An American Protestant Episcopal clergyman and author, born in Lowell, Mass. He graduated at Harvard in 1859 and in 1859-60 was an instructor in chemistry there. Entering the Episcopal ministry, he was rector of All Saints Church, Worcester, Mass., in 1862-83 and of Grace Church, New York, from 1883 until his death. Dr. Huntington always took a prominent part in public affairs. He was active in the movement for liturgical revisions and was long chairman of the Prayer-Book Revision Committee, and editor with Dr. Samuel Hart of the *Standard Prayer-Book* of 1892. He wrote *The Church Idea, an Essay toward Unity* (1870), *Conditional Immortality* (1878), *The Book Annulled Its Critics and its Prospects* (1886), *Short History of the Book of Common Prayer* (1893), *A National Church* (1898), *Sonnets and a Dream* (1904), *A Good Shepherd and Other Sermons* (1906).

HUNTLY, GEORGE GORDON, fifth EARL OF (?-1576). A Scottish statesman. He was educated for the Church, but gave up the idea of entering it upon the death of his elder brother and became sheriff of Inverness and the keeper of its castle (1556). Entering into the political plots of his time, he was more than once imprisoned and condemned to death. Mary, Queen of Scots, released him and restored his estates and title, with a view to gaining his adherence, but he refused to turn Catholic to please her, though he sided with his brother-in-law, Bothwell, in the troubles that followed. Huntly tried to rescue Rizzio and was a main mover in the murder of Darnley as well as in the Queen's subsequent marriage to Bothwell, to which he was a witness. He conspired to rescue his royal mistress from Lochleven (1568) and raised troops in her service, but his lifelong enemy, the Earl of Murray, vanquished him at last, and Huntly's resolve to give up her cause as hopeless was Mary's chief reason for surrendering to Elizabeth. Consult J. H. Burton, *The History of Scotland* (Edinburgh, 1867-70).

HUNTOON, hūn-tūn', **LOUIS DOREMUS** (1869-) An American mining engineer. He was born at Paterson, N. J., and graduated from the New York College of Pharmacy in 1890 and from the School of Mines (Columbia) in 1895. He was a chemist and assayer in Colorado (1895-96) and mining and metallurgical engineer in New York (1896-1903), served as assistant professor (1904-08) and professor (1908-11) of mining and metallurgy at Sheffield Scientific School (Yale), and was consulting engineer in New York City after 1911. He became a contributor to the *NEW INTERNATIONAL ENCYCLOPEDIA*.

HUNTSMAN (BENJAMIN) PROCESS. See IRON AND STEEL, METALLURGY OF, under *Crucible Process*.

HUNTSVILLE. A town in Muskoka Co., Ontario, Canada, on the Grand Trunk Railway (Map Ontario, E 3), 145 miles north of Toronto. Its manufacturing establishments include several lumber mills, a tannery, leather factory, and machine shop. The town owns its lighting system and water works. It is a summer resort. Pop., 1901, 2152, 1911, 2358.

HUNTSVILLE. A city and the county seat of Madison Co., Ala., 111 miles by rail north of Birmingham, on the Southern and the Nashville, Chattanooga, and St. Louis railroads (Map Alabama, C 1). It is in the fertile valley of the Tennessee River and has important farming, cotton-growing, and stock-raising interests. There are cotton mills, a foundry, machine shops, saw mills, sash and blind factories, oil and fertilizer mills, a fibre factory, etc. Among the educational institutions are a State normal and industrial school and the Goodrich Training School. Other features are the high school, famous Big Spring, and Monte Sano. Huntsville has adopted the commission form of government. The city owns its water works. Settled in 1775, Huntsville was first incorporated in 1800. At one time it was the capital of the State. Pop., 1900, 8068, 1910, 7611, the decrease being due to the narrowing of the city's corporate limits.

HUNTSVILLE. A city and the county seat of Randolph Co., Mo., 122 miles east of Kansas City, on the Wabash Railroad (Map Missouri, D 2). It has coal mines, manufactures agricultural implements, and trades in coal, farm

produce, live stock, etc. The water works are owned by the city. Pop, 1900, 1805, 1910, 2247.

HUNTSVILLE A city and the county seat of Walker Co., Tex., 74 miles north of Houston, on the International and Great Northern Railroad (Map Texas, E 4). It is an important cotton market, has trucking and live-stock interests, and manufactures cotton goods, cottonseed-oil, lumber, wagons, furniture, steam engines, boilers, cigars, etc. The city has the Sam Houston Normal School (State), the State penitentiary, and, of historic interest, the old home and grave of Gen. Sam Houston and the grave of H. Yokum, the first historian of Texas. Huntsville was first settled about 1836. The government is administered by a mayor, elected every two years, and a unicameral council. Huntsville owns its water works. Pop., 1900, 2484, 1910, 2072.

HUNYADY, hun'yō-dī, JÁNOS (John Hunyades) (c 1387-1456). The national hero of Hungary. His origin is shrouded in obscurity. He saw his first military service under King Sigismund. Under Sigismund's successor, Albert II (1438-39), he became known as a brilliant soldier and was ban of a district on the borders of Transylvania, exposed to the Turkish attacks. It was the period when the Turkish power was at its height, and it seemed within the range of possibility that the Mohammedans would obtain possession of the greater part of the Danube valley and seriously menace Western civilization. To Hunyady, more than to any other one man, Europe owes it that the danger was averted. Albert died in 1439, and as there was no male heir, the nobles elected King Ladislas, of Poland, to the Hungarian throne. Meanwhile the wife of Albert gave birth to a son, Ladislas Posthumus, and a civil war resulted, of which the Turks took advantage. Hunyady, however, defeated them in several battles, and in 1443 an advantageous peace was made. Nevertheless King Ladislas, incited by the papal legate, Julian Cesarini, began war again, and on Nov. 10, 1444, the Hungarian army under Ladislas and Hunyady was overwhelmed at Varna. Ladislas was among the slain, whereupon Ladislas Posthumus was recognized by all parties as King, and Hunyady was made Regent during the minority. War was actively carried on both against the Turks and Frederick III. In 1448 Hunyady was completely defeated by the Turks at Kossovo, after which he was held prisoner for a short time by the Servians. His most splendid achievement was the defense of Belgrade in 1456 against the army of Mohammed II, the conqueror of Constantinople, in which he was aided by the celebrated Giovanni da Capistrano (qv). The Turkish attack began about June 15, 1456, and on July 14 Hunyady forced his way into the city, while Szilágyi, the commander of the town, made a sortie, and finally, on July 21, the Turks were decisively repulsed and raised the siege, having lost 80,000 men. A few days after this glorious victory the plague broke out in the army, and Hunyady, the great Christian hero, after a short illness fell a victim to the disease. He left two sons, Ladislas and Matthias Corvinus. The former was treacherously imprisoned and beheaded at Buda by Ladislas Posthumus. Matthias, generally known as Matthias Corvinus, became King of Hungary in 1458. Consult Bain, "The Siege of Belgrade," in the *English Historical Review*, vol. vii (London,

1892), László Szalay *Geschichte Ungarns*, vol. iii (Budapest 1874). Armin Vámbéry, *Story of Hungary* (New York, 1894).

HUNZAS, hūn'zaz. One of the Aryan tribes of Dardistan, inhabiting the district about Hunza.

HUON DE BORDEAUX, u'ōn' de bōr'dō'. A French *chanson de geste*, probably belonging to the thirteenth century and then somewhat altered when rewritten for Charles Seigneur de Rochefort, early in 1454. The oldest printed edition is in folio and without date, the second, in quito, bears the date 1516. The English translation was made by Lord Berners, in Henry VIII's time. The subject has proved a tempting one for poets, the famous *Oberon* of Wieland and Weber's opera of the same name being among the poems founded upon it, while Shakespeare drew from it in the *Midsummer Night's Dream*. A prose adaptation has been issued by Gaston Paris (1899). Consult Gaston Paris, *Poemes et légendes du moyen-âge* (Paris, 1899), Charles Voretzsch, *Epische Studien*, vol. 1 (Halle, 1900). Gustav Grober, *Grundriss der romanischen Philologie* (Strassburg, 1902), Albert Counson, *La légende d'Obéon* (Brussels, 1903), J. Bedier, *Les légendes épiques* (Paris, 1908).

HU'ON PINE. See DACRYDIUM.

HUPA, hū'pa. A tribe of Athabascan stock, originally occupying a number of small villages on the lower Trinity River, Cal., and now gathered on the Hupa Valley Reservation in the same region. In their pristine condition they subsisted chiefly upon salmon, dried and smoked, and acorns made into flour and porridge. They were noted for the variety and beauty of their basketry. They now number 639, not including some remote tribes. Our knowledge of the ethnology of this tribe is derived entirely from P. E. Goddard's *Life and Culture of the Hupa*, in the publications of the University of California, vol. 1 (1903).

HUPEH, hu'pē (Chin., north of the Lake). One of the 18 provinces of China proper, situated in the very centre of the country and surrounded by the populous and important provinces of Hunan on the south, Szechwan on the west, Shensi and Honan on the north, and Anhui on the east (Map China, K 5). The Yang-tse from west to east runs through its southern part, while the Han, in its tortuous course from the northwest, irrigates its fields and provides a splendid waterway for its commerce. The province is mountainous in the north, being penetrated with spurs and outlines from the Ta-pa-shan and Fu-mu mountains. Towards the centre and southwest it is low-lying, forming an extensive triangular plain, admirably suited to the growth of cotton, and covered with many marshes, shallow lakes, and lagoons, the remains of that portion of the Tung-ting Lake which formerly spread much farther north than it does now. These sheets of water have been connected by navigable ditches and serve as a safe short cut for the smaller class of native junks from Shashu (on the Yang-tse opposite the entrance to the Tung-ting) to Hankow, or to towns farther up the Han.

The area of the province is estimated at 71,400 square miles, and the population at 24,900,000 according to the Chinese census of 1910 and 34,000,000 according to the customs estimate. The capital is Wuchang, on the Yang-tse, oppo-

site Hankow. The great iron and steel works are at Hanyang on the Han, across from Hankow. The combined population of these three cities is estimated at 870,000. There are three treaty ports in Hupeh—Hankow, Ichang (pop., 55,000), and Shasi (95,000). Hupeh is a favored province for modern industries because of its extensive coal fields. Both coal and iron are actively mined by modern methods. There is at present a little opium grown in the province, but the laws are being drastically enforced, and all opium cultivation will doubtless soon disappear.

HUPFELD, hūp'fēlt, HERMANN (1796-1866). A German theologian and Orientalist. He was born in Marburg, studied at the university there, was professor of theology and Oriental languages from 1825 to 1843. In the latter year he succeeded Gesenius at Halle. His most important work is the *Uebersetzung und Auslegung der Psalmen* (3d ed., 1898), characterized by sound scholarship. His further publications include *Exercitationes Æthiopice* (1825), *Die Quellen der Genesis* (1853), *Die heutige theosophische und mythologische Theologie und Schriftexegese* (1861). Consult Riehm, *Dr Hermann Hupfeld* (Halle, 1867).

HURA, hū'ra (Neo-Lat., from the native name). A genus of euphorbiaceous plants. *Hura crepitans*, a native of the West Indies and tropical America, is a tree which abounds in a very acrid milky juice and has stalked, heart-shaped, acuminate, leathery leaves. The fruit is a woody capsule, of the size of a large apple, very much flattened, formed of 12 to 15 carpels, each containing a large seed. These carpels surround a common axis and separate with great elastic force. The tree is called sandbox tree, because, before the use of blotting paper became general, the capsule was generally used in the West Indies as a sandbox for powdering letters with fine sand. The seeds are a violent drastic purgative.

HURALT, hū'alt, PHILIPPE. See CHEVERNY, COUNT DE.

HUR'AM. See HIRAM.

HURD, HENRY MILLS (1843-) An American psychiatrist, born at Union City, Mich., and educated at the University of Michigan (A.B., 1863, M.D., 1866). He was superintendent of the Eastern Michigan Asylum at Pontiac in 1878-89 and thereafter served as professor and professor emeritus (1906) of psychiatry at Johns Hopkins University, and until 1911 as superintendent of the Johns Hopkins Hospital. He was president of the American Academy of Medicine (1896), of the American Medico-Psychological Association (1898-99), and of the American Hospital Association (1912). He edited the Johns Hopkins bulletins and reports (1890-1911), was coeditor of the *American Journal of Insanity* after 1897 and of the *Modern Hospital* after 1913, and with John S. Billings he is author of *Hints to Hospital Visitors* (1895), and editor of *Hospitals, Dispensaries, and Nursing* (1893).

HURD, RICHARD (1720-1808). An English prelate. He was born at Congreve in Staffordshire, Jan. 13, 1720, studied at Cambridge University, and became fellow of Emmanuel College in 1742. In 1749 appeared anonymously his first notable production, *Commentary on Horace's Ars Poetica*, in which he advocated the now discredited theory that the poem was a systematic criticism of the drama of the Romans. In

1750, on Warburton's recommendation, he was appointed one of the Whitehall preachers. He became Bishop of Lichfield and Coventry (1775) and in 1783 declined the archbishopric of Canterbury. He died at Hartlebury Castle, May 28, 1808. His principal works are *Moral and Political Dialogues*, in which historic characters are introduced as interlocutors on such themes as sincerity, retirement, the golden age of Elizabeth, and the constitution of the English government (1759), *Letters on Chivalry and Romance* (1762), and *An Introduction to the Study of the Prophecies Concerning the Christian Church, and Particularly Concerning the Church of Papal Rome* (1772). He edited the *Works of Warburton* and of Cowley. His complete works with life appeared in eight volumes (London, 1811). Consult his life by F. Kilvert (London, 1860).

HURDWAR, hērd-war'. See HARDWAR.

HURDY-GURDY (of onomatopoeic origin). A very old musical instrument of the stringed kind, which, under the name of *leyer*, or *Bauernleier*, spread from its native country Germany, over a great part of Europe. The hurdy-gurdy consists of a flat, oval-shaped sounding board, over which the strings are stretched, with a back or bottom of the same size and shape. These are bound together by tolerably deep sides, or ribs. On one side are from 10 to 12 finger keys, for shortening the sounding lengths of the strings when required. There are four strings of gut which are put into a state of vibration by being rubbed by the edge of a small wooden wheel charged with rosin and turned by a handle. Two of the strings are tuned in unison as a keynote, or one of them a fifth above, they are placed out of reach of the keys and form a sort of drone bass. The other two strings are acted on by the keys and produce a diatonic scale of from 10 to 12 notes. The hurdy-gurdy is suited only to simple music and was used for such as had many repetitions. From the tenth to the twelfth century it was one of the most popular instruments, but was then superseded until the eighteenth, when it again, and especially in France, became very popular. It is now nearly obsolete. The name is also colloquially applied to a large street or barrel organ (qv). For illustration, see **MUSICAL INSTRUMENTS**. Consult H. Lapaire, *Vielles et cornemuses* (Paris, 1901).

HURGRONJE, CHRISTIAN SNOUCK. See SNOUCK HURGRONJE.

HURLBUT, JESSE LYMAN (1843-) An American Methodist Episcopal clergyman. He was born in New York City, graduated at Wesleyan University in 1864, and held pastorates at Newark, Montclair, Paterson, Plainfield, Hoboken, Morristown, Orange, and Bloomfield, N. J. After 1879 he was connected with the Sunday-school and tract work of his denomination. He was secretary of the Epworth League in 1889-92 and for some time was associated with Dr. J. H. Vincent in the direction of the Chautauqua Literary and Scientific Circle. From 1909 until his retirement in 1914 he was district superintendent of the Newark District. Among his works are *Manual of Biblical Geography* (1882), *Outlines in Old Testament History* (1890), *Our Church* (1902), *Story of the Bible* (1905), *Outline Studies in the New Testament* (1906), *Teacher Training Lessons* (1908), *Organizing and Building up the Sunday School* (1909), *Traveling in the Holy Land*

through the Stereoscope (1913), *The Superintendent's Helper* (1915)

HURLBUT, STEPHEN AUGUSTUS (1815-82) an American soldier and diplomat, born in Charleston, S C. He studied law, was admitted to the bar in 1837, and practiced in Charleston until 1845, when he removed to Belvidere, Ill. He was a Whig member of the Illinois State Constitutional Convention in 1847, served as a Whig residential elector in 1848, was in the State Legislature from 1859 to 1861, and in May, 1861, became a brigadier general of volunteers. He commanded a division at Fort Donelson, after its capture, and at Shiloh, was promoted to be major general of volunteers in 1862, commanded the Sixteenth Army Corps during Sherman's Mississippi campaign of 1864 and succeeded General Banks as head of the Department of the Gulf. He was returned to the Illinois Legislature in 1867 and was a Republican presidential elector in 1868. From 1869 to 1872 he served as United States Minister to Colombia, was a member of Congress from 1873 to 1877, and in May, 1881, he was appointed United States Minister to Peru, where he died the following year.

HURLEY A village and the county seat of Iron Co., Wis., on the Montreal River, opposite Ironwood, Mich., 39 miles east by south of Ashland, on the Chicago and Northwestern, and the Minneapolis, St. Paul, and Sault Sainte Marie railroads (Map Wisconsin, C 2). It is in the productive Gogebie iron-mining district, several large mines being in the vicinity, and is engaged to some extent also in lumbering, farming, and stock raising. Pop., 1914 (local est.), 600.

HURLING A field sport, formerly much played in Ireland, akin to the more modern game of hockey (qv). It is played to-day on a field 150 X 84 yards, with goals at each end, having posts 21 feet apart and a crossbar 8 feet high, and two point posts 6 feet high, 21 feet on each side of the goal posts. The field is lined across, parallel with the goals, at 21 and 50 yards, and halfway down the hurley stick approximates to the ice-hockey stick in shape, but is held with the left hand below the right. The ball, or shtter, is of cork, round round with woolen threads and covered with leather. It is 5 inches in diameter and weighs 7 ounces. Play is begun by the 17 or 20 players on each side facing each other in the center of the field. The referee then throws the ball between the two lines of players, who thereupon scatter to their respective positions in the field. The object of the players is to drive the ball through the space between their opponents' goal posts. If the ball passes over the side line, previously appointed sidesmen throw it back into play. The ball may be caught with the hand, but must be at once played with the hurley. In a scrimmage, when the hurleys are cocked, the ball may be moved with the foot. There are some very pretty strokes made with the hurley, notably that where the ball is raised in the air with the point and hit forward as it falls.

HURLOTHURMBO An operative burlesque, written by one Samuel Johnson, a Cheshire dancing master, in 1723, and produced at the Haymarket, April, 1729.

HURON, hū'rōn A city and the county seat of Beadle Co., S. Dak., 120 miles east of Pierre, on the Chicago and Northwestern and the Great Northern railroads (Map South Dakota, F 3).

It is in a fertile agricultural and stock-raising region, is a division headquarters of the Chicago and Northwestern Railroad, with machine shops, roundhouses, etc. and has flour mills and grain elevators, carriage and wagon shops, a brickyard, a creamery and other industries. Huron is the seat of Huron College (Presbyterian) and contains fine high-school and government buildings. The city adopted the commission form of government in 1910. It owns its water works. Pop., 1900, 2793, 1910, 5791.

HURON An Indian tribe. See WYANDOT.

HURON, hū'rōn'. The name of certain animals of the family Mustelidae. See GRISON.

HURON, hū'rōn, LAKE One of the five Great Lakes on the north frontier of the United States, between Lake Superior on the northwest and Lake Erie on the southeast, connected with Lake Michigan on the west, and bounded on the southwest by Michigan and on the north, east, and south by the Province of Ontario (Map United States, K 2). It is the second in size of the Great Lakes, having a total area of 23,200 square miles and being 235 miles long from the St. Clair River to the Straits of Mackinac and 98 miles wide along the forty-fifth parallel. A large arm of the lake in the east, extending far into Ontario and known as Georgian Bay, is 125 miles long and 60 miles in maximum width. Lake Huron receives the waters of Lake Superior through the St. Mary's River and those of Lake Michigan through Mackinaw Straits. Its outlet is the St. Clair River flowing into Lake St. Clair, which is connected by Detroit River with Lake Erie. A slight current follows the west shore from inlet to outlet. The general direction of the lake lengthwise is from north-northwest to south-southeast. The surface is 9 feet above the level of Lake Erie, 335 feet above Lake Ontario, and 581 feet above the sea, with occasional fluctuations as in the other lakes. Its maximum depth is 802 feet in the main body, while that of Georgian Bay is somewhat more than 300 feet near its western shore. The waters are very clear and cold, especially in the northern part, and abound in fish, of which the whitefish is the most important.

There are few harbors on the west side, but vessels find shelter in Saginaw Bay (50 miles long by 26 miles wide at its mouth), about 70 miles north of the outlet, and also in Thunder Bay, as much farther north and about 78 square miles in area. Presque Isle is also a fair harbor, and there is good shelter under the south side of the island of Mackinaw. The lake is subject to violent storms, but navigation is safe from May 1 to December 1. Mackinaw has long been an important port for fur trade with the Indians. Bay City, at the head of Saginaw Bay, is an important lumber depot, and copper mines have been opened in the upper portions of Manitowlin Bay. Excellent grindstones are cut from the sandstone near Thunder Bay. The main body of water is unbroken by islands, but there is a group of islands in the north, most of them belonging to Canada, the largest of which is Grand Manitowlin. There is much geological evidence to the effect that Lake Huron was formerly deeper and more extensive than at present. Consult E. P. Moulton, *Lake Huron and the Country of the Algonquins* (Chicago 1913). See GREAT LAKES.

HURO'NIAN SERIES See PRE-CAMBRIAN FORMATIONS.

HURRICANE. See STORM, WIND.

HURRUR, hūi-rūi See HARRAR

HURST, JOHN FLETCHER (1834-1903) An American Methodist Episcopal theologian, bishop, and educator. He was born near Salem, in Dorchester Co., Md., graduated at Dickinson College in 1854, and studied theology at the universities of Halle and Heidelberg. After his return to America he held a pastorate in New Jersey from 1858 until 1866. Again going to Germany, for three years he taught theology at the Mission Institute in Bremen and at Frankfurt-on-the-Main, and then traveled extensively in Europe, Syria, and Egypt. In 1871 he was chosen professor of historical theology in the Drew Theological Seminary, Madison, N. J., becoming its president two years later. In 1880 he was elected Bishop, and spent much time visiting missions and conferences in Europe and India. In 1891 he was chosen chancellor of the American University, Washington, which he had helped to found. He wrote and translated numerous works on Church history, including a *History of Rationalism* (1865), *Martyrs to the Tract Cause* (1873), *Our Theological Century* (1876), *Bibliotheca Theologica* (1883), *The Literature of Theology* (1896), a *History of the Christian Church* (2 vols., 1897-1900), *History of Methodism* (7 vols., 1904). Consult Albert Osborn, *John Fletcher Hurst* (New York, 1905).

HURTADO DE MENDOZA, ōi-ta'dō da mān-dō'tha, GARCIA, MARQUIS OF CAÑETE (1535-1603). A Spanish administrator, born at Cuenca. He fought in Italy and Germany, but by 1557 was Governor of Chile, where he took part in the local wars. Returning to Spain in 1561, he held numerous diplomatic posts and fought in the war against Portugal. From 1590 to 1596 he was Viceroy of Peru. Consult M. de Mendiburu, *Diccionario histórico-biográfico del Perú*, vol. IV (Lima, 1880).

HURTADO DE TOLEDO, dā tō-lā'dō, LUIS (c.1530-1591). A Spanish poet, born at Toledo, who in recent years gained an ephemeral celebrity by being credited with the authorship of the famous romance of chivalry (second only to the *Amadis de Gaula*), *Palmerin de Inglaterra*. This attribution has been abandoned, and Luis Hurtado turns out to have been, with regard to this work, only a very poor translator of a Portuguese original, and even this assignment is disputed. It seems safe to credit him only with the authorship of several minor works and with the completion of others. Consult Perálvarez de Ayllón y Luis Hurtado de Toledo, *Comedia Trilalda* (ed. Bonilla y San Martín, *Biblioteca Hispanica*, vol. XIII, Madrid, 1903), and the searching study by W. E. Puizer, *Palmerin of England* (Dublin and London, 1904).

HURTER, hur'tēr, FRIEDRICH EMANUEL VON (1787-1865). A Swiss historiographer. He was born at Schaffhausen and educated there and at Göttingen. He was pastor at Beggingen (1808) and at Löhningen and in 1835 was made dean and antistes of the Reformed synod. After the publication of his *Geschichte des Papstes Innozenz III und seiner Zeitgenossen* (1834-42), he became a Roman Catholic (1844). At about the same time he published *Die Befehdung der katholischen Kirche in der Schweiz seit 1831* (1842-43) and *Geburt und Wiedergeburt* (1845), an apologia for his conversion. In 1846 he settled at Vienna and was made historiographer to the Emperor of Austria. Under the liberal rule of Pölsersdorf he resigned this position, but

was reappointed in 1851. His other historical works include *Geschichte des ostgothischen Königs Theodorich* (1807), *Denkwürdigkeiten aus dem letzten Decennium des 18. Jahrhunderts* (1840), *Philipp Lang, Kammerdiener Rudolfs II* (1851), *Zur Geschichte Wallensteins* (1855), *Wallensteins vier letzte Lebensjahre* (1862). Consult Heinrich von Hurter, *Friedrich von Hurter und seine Zeit* (2 vols., Gratz, 1876-77).

HUS See HUSS

HUSAIN See HASAN

HUSBAND AND WIFE A man and a woman married to each other. As marriage is a status recognized by law, it is obvious that it will alter the legal relations of the parties to it, not only as between themselves but also with respect to other persons. The new relation creates new rights and duties of a reciprocal nature, and at the same time new responsibilities with respect to the state, the community, and the individuals who come into relation with it. It is not so obvious, however, that the rights and obligations so arising should be unequal, that one member of the new relationship should come under dominion of the other and at the same time lose his or her legal identity, or the rights and responsibilities of a member of the community—in other words, cease in greater or less degree to be what legal philosophers call a "juristic person." Yet this has, in all legal systems of which we have any knowledge, at least in the earlier stages of their development, been the consequence of marriage to the woman.

Roman Law In the early period of the Roman law the power of the husband over his wife and her property was absolute, as the *patria potestas*. Whatever property the wife acquired, both before and after marriage, became the property of the husband, but in case the wife survived the husband she was entitled to share her husband's property equally with the children. At a later period, but before the time of Justinian, owing possibly to the lack of any formal marriage, we find a fully developed system of law relating to married women which, unlike the common law, was based upon the theory that husband and wife were in law distinct persons having independent rights and liabilities. The wife remained responsible for her own debts. She could sue and be sued independently of her husband, and her husband could not subject her property to any disability. While there were some restrictions upon the power of women to contract, there was no distinction in this respect between married women and unmarried women. The husband, as at common law, was bound to support the wife, but as compensation for this liability his wife or her family was required at the time of the marriage to provide the husband with the *dos*, or dowry. The increase from the *dos* was the husband's property. He could also dispose of the *dos* so far as it was personal property, but not if it were real estate, and in the case of termination of the marriage by death or divorce, the *dos* was required to be returned to the wife. Corresponding to the *dos* was the *donatio ante nuptiam* or the *donatio propter nuptiam*, a gift made by the husband to the wife before the marriage. Not much is known of these, but it seems probable that the *donatio* was not required to be equal to the *dos*, but was given as a provision for the wife after her husband's death, she having lost the right to share equally in her husband's property with the chil-

dren of the marriage. These rules of law might, however, be freely modified by antenuptial contracts, which were enforced much as courts of equity enforced antenuptial contracts entered into at common law.

Common Law. In the common-law system of England and the United States the effects of marriage may be considered in two aspects: first, as regards the persons and the personal rights of the husband and wife, and, second, as regards their property relations.

1. *Personal Relations.*—By marriage at common law the husband became legally bound to support the wife in a manner consistent with his resources and social position. He also became bound to pay all debts contracted by her before the marriage, and when sued with the wife became responsible for her torts committed either before or during coverture. In all other respects he remained in precisely the same position as before marriage. Independently of his wife he could sue and be sued, enter into contracts with others, bind himself as fully after as before marriage, and he could make a will bequeathing all his property to strangers subject only to the wife's right of dower in his legal estates of inheritance. As regards the person and personal rights of the wife, however, there was a material difference. Her person was said to be merged in that of her husband, and for many purposes they were treated as one person in the eye of the law. The wife could neither sue nor be sued independently of the husband. Her contracts were wholly void, even when made with her husband. Even the personal property she had before marriage became her husband's absolutely, and he could dispose of it at will. She had no power to make a will of real estate, and her will disposing of personal property owned by her before her marriage could be effective only when authorized or consented to by the husband at her death. As the husband, however, was bound to support the wife, she had authority in law without his consent to pledge his credit for necessities supplied by third persons. Necessaries are any articles of personal use, as food or wearing apparel, which are suited to the rank and position in life of the husband, and with which the wife is not provided. Therefore, if goods were ordered by the wife which were not necessary, the husband was under no legal liability to pay for them unless he expressly or impliedly ratified his wife's act in purchasing them. Though the husband was bound to maintain his wife, there was no direct means of enforcing this duty. The wife could not sue the husband herself, but, as she had an implied authority to order necessities, the tradesman so supplying them could sue the husband for the price. The wife also might impose liability on the husband by contract for articles not necessities by virtue of an implied authority as agent of the husband to purchase such articles; thus, a husband was liable to pay for articles such as he had regularly permitted his wife to purchase on his credit before, although he knew nothing of the particular purchase in question. See AGENT.

The husband, being entire master of his own actions, has the power to decide where to live, and the duty of the wife is to live with him in the same house. So long, then, as the husband and wife continue to live together, the domicile of the wife is determined by the domicile of the husband. If she ceases to live with her husband,

she may then acquire an independent domicile. If the wife lives apart from the husband without just cause, he is not bound to support her even with necessities. If, however, she separates from him for just cause, the liability of the husband for necessities continues. There are, at common law, several just causes for her living apart from her husband. If the husband, e.g., treats her with what is deemed cruelty in the eye of the law, as keeping a mistress in the house, or starving her, or assaulting her, she is entitled to leave him and can order necessities at his expense from any tradesman willing to supply her. There are, however, many degrees of cruelty and ill usage for which the wife has practically no remedy, and of which the law can take no cognizance. The statement frequently found in the early treatises that the husband has at common law the right reasonably to chastise the wife was probably without authority and certainly has no support in modern law. The husband can enforce the wife's antenuptial contracts and can recover for torts committed towards her either before or after the marriage by joining her with himself as plaintiff in an action. For torts resulting in loss of her services to him or requiring him to provide medical attendance or other necessities he can recover in his own name and right. He may also recover damages from a third person for unlawful intercourse with his wife, and either husband or wife might recover damages from a third person for alienating the affections of the other. As regards crimes committed by a wife, she is in general liable to be punished for them in the same way as if she were unmarried. But there is a peculiarity as regards crimes committed by the husband and wife jointly in the husband's presence. If the crime be treason or murder, both are punished precisely as if they were unmarried. But in all the lesser crimes the theory, as well as the practice, is that if the wife was a party to the crime, and committed it in her husband's presence, she is presumed by the law to have so acted under the compulsion or coercion of her husband and is acquitted as a matter of course. The presumption may, however, be rebutted by showing that in fact the wife was not coerced by the husband, but in the absence of any direct evidence one way or the other it is presumed that the wife acted under this marital coercion, and so she escapes punishment. Another curious anomaly arising from the doctrine that husband and wife are in law one person is that the wife cannot be convicted of stealing her husband's goods. If she absconds with his property, however valuable, she cannot be punished. But this rule is qualified by the circumstance that if she commits adultery and afterward absconds with the adulterer, both taking away the husband's goods, the adulterer may be convicted of the larceny, though it is doubtful if she is in that case liable to any punishment.

At the common law, also, husbands and wives may be witnesses for or against other parties in all civil cases, i.e., actions and suits relating to debts, contracts, and wrongs which are not crimes, and in all inquiries of a civil nature. But neither can testify for the other in an action to which the other is a party, though either can be compelled by the opposite party to be a witness. In no case can husband or wife be compelled to disclose any confidential communication made to him or her by the other during

coverture As regards all criminal proceedings instituted against either husband or wife, the other spouse is neither competent nor can be compelled to be a witness, but where the husband and wife are not the accused, but are the prosecuting parties, then, inasmuch as the state is presumed to be the prosecutor, and the husband and wife are not, strictly speaking, parties to the action, they may both be witnesses, subject to the qualification as to not being bound to disclose confidential communications made by and to each other during marriage There is an exception also to the rule that neither can be a witness against the other in criminal proceedings—viz, where the wife charges her husband with an assault or other crime of greater degree upon her person She is in that case a competent witness against him, for otherwise the crime might go unpunished Moreover, in all proceedings instituted in consequence of adultery of the husband or wife, neither of the married parties is competent or can be compelled to be a witness against the other

2 *Property Relations*—As regards the husband, he not only remains sole owner of his property and, subject to the wife's right of dower, can do what he likes with it, but he becomes absolute owner of her personal property of every kind which is capable of being reduced to possession As will be hereafter explained, he also becomes a qualified owner of her choses in action (qv) and her chattels real The legal title of the wife's real estate remains in the wife, but she cannot convey it without the husband joining in the conveyance, and the rents, issues, and profits of her real estate belong absolutely to her husband As a consequence of the common-law rule that the husband is entitled to the services of the wife, he becomes entitled to her earnings acquired by rendering service to others It will thus be seen that during coverture the wife cannot, at common law, acquire any personal property in her own right, and her title to real property acquired before or after her marriage is subject to the rights of the husband, as stated The old rule as to the wife's personal property becoming the husband's absolutely after marriage suffered qualification when such property consisted not of money or chattels, but of what are called chattels real, such as leases and mortgages (See CHATTEL) In such a case they become so far the property of the husband that he can sell them during his life, but he cannot bequeath them by will, and on his death they remain hers, while on her death they become his Again, where the wife's personal estate before marriage includes rights of action, or debts due to her, these become so far his that he can at any time sue for them and so reduce them into possession and make them his own absolutely, but he cannot bequeath them by will, and if he does not sue for them in his lifetime they survive to the wife after his death As regards the wife's real estate—i.e., her lands and houses held in freehold—the husband acquires a qualified legal interest (he is said to be jointly seised with his wife), which, as has been pointed out, entitled him to the rents, issues, and profits, and consequently to lease the real estate during the coverture, and if the wife bear him a living child, upon her death he becomes entitled to a life interest in her real estate, known as tenancy by the curtesy (qv) Upon marriage the wife also acquires an inchoate right to dower in any and all

estates of inheritance of which the husband may be or become seised during coverture—i.e., a life estate in one-third of all such real estate This right becomes complete only upon death of the husband before the wife, but it cannot be impaired by any act of the husband during the coverture or by the wife herself except by joining with her husband in a conveyance to a third party (See DOWER) All real estate conveyed to husband and wife together, unless otherwise defined by the instrument of conveyance, is deemed to be an estate known as an *estate by the entirety* Its peculiarity is that while the husband is entitled to the rents, issues, and profits during coverture, neither can convey the title, nor his or her interest therein, without the other, and upon the death of either the survivor becomes entitled to the property absolutely On the death of the husband, the wife surviving, she becomes entitled only to her paraphernalia, so called, which consists of her personal apparel and jewels, but even these may be taken by her husband's creditors if there be a deficiency of assets When the wife dies before the husband, he becomes entitled to all her personal estate, of whatever description, even though she leave children of the marriage, and it must be recollected that she can at the common law, generally speaking, make no will which has any effect if the husband chooses to repudiate it The wife's real estate passes to her heirs subject only to the husband's right, as tenant in curtesy, to hold it for his life The English courts of chancery, by application of the doctrine of uses and trusts (qv), mitigated to some extent the harshness of the common-law rules relating to the property rights of married women By an antenuptial agreement between the parties to the marriage, called a marriage settlement, or by other means, not only all the property she may have had before marriage, but property to which she may afterward become entitled, may be given to trustees to hold for her separate use The settlement may give her a practically unlimited right of control over the property thus settled upon her which equity would enforce and she may thus receive regularly the income of the trust and use of it for her own purposes She may bind this separate estate by contract and even dispose of it by will Courts of equity will also in a proper case enforce agreements made between husband and wife, and in certain cases will enforce a conveyance made by the husband to the wife when made for the purpose of providing for the wife The various rights thus created and enforced by the courts of equity are known as married women's separate estates

Statutory Changes The preceding statement is an outline of the rights and obligations of the husband and wife as developed in the courts of common law and equity Half a century ago public attention was first directed towards the essential injustice of the prevailing law to the married woman The agitation which followed took fast hold upon the public conscience and ultimately found expression, both in England and the United States, in a series of statutes known as married women's enabling acts New York was the first State to adopt this reform, by an Act passed in 1848, and its example was followed by other States in rapid succession The various statutes relating to the subject have been repeatedly revised, and their scope widened by amendment, until at the pres-

ent time in most jurisdictions, though the statutes differ in minor particulars, married women are on a substantial equality with their husbands with reference to both personal rights and rights of property, and each is practically independent of the other with reference to all matters outside the marriage relation itself. In all jurisdictions the husband is still under the common-law obligation to support his wife and to provide her with necessaries, and the wife, by acting as his agent, may still bind the husband by contract. As the husband no longer acquires any interest in the wife's personal property or choses in action, he is not subject to the corresponding obligation to answer for her torts and contracts, they being an obligation of the wife alone, for which she may be separately sued. Either may sue or be sued independently of the other. While the husband may no longer take the wife's earnings, he is in a general sense still entitled to her services, so long as she continues to give them to him, and he may sue in his own right to recover for torts causing loss of her services, and either may sue for alienation of the affections of the other. The law of domicile of the husband and wife remains unchanged, the husband's domicile being deemed that of his wife. The wife still has dower in the husband's real estate, except in some States in which she has been given the right of inheritance in lieu thereof, and in some of the Southern and Western States she has by statute a homestead in the husband's lands. In most States the husband may acquire curtesy in the wife's real estate, but in some, like New York, the wife may defeat his right by conveyance or will. In some States, as New Jersey, the wife cannot convey her real estate as freely as the husband may, but must be examined apart from her husband by a notary, commissioner, or judge before making the conveyance, who must ascertain whether the conveyance is freely made without coercion by the husband. Estates by the entirety are now generally obsolete, the husband and wife taking as tenants in common where a conveyance is made to them together, but tenancy by entirety is still favored in several of the States. In nearly all jurisdictions statutes of distribution (qv) have been enacted, by which either party to the marriage becomes entitled to a part of the personal property of the other in case of his or her death without having disposed of it by will. In other particulars these statutes follow closely the analogy of the law of inheritance. Provision has also been made by statute in most jurisdictions for directly compelling the husband to support the wife by means of a quasi-criminal proceeding brought at her instance. The same result may be obtained by the various statutory forms of judicial separation (see *DIVORCE*), by which the husband may be compelled to pay the wife certain sums of money as alimony (qv).

The criminal law relating to husband and wife as well as the rules relating to their competency to testify for or against one another in criminal proceedings, remain substantially unchanged. The husband and wife are now generally competent witnesses in all civil actions with the exception of an action for divorce brought by one against the other, in which case neither is allowed in most jurisdictions to testify against the other or to acts of adultery committed by the other, and in no case is either allowed to testify as to any confidential commu-

nication made to or received from the other during coverture. See *MARRIAGE*, *COVERTURE*, *DIVORCE*, *DOMESTIC RELATIONS*.

Scots Law The law of husband and wife in Scotland as regards their personal rights and disabilities, and the property during the marriage, does not substantially differ from the law of England, but the following points may be noticed. As regards their persons and personal rights and crimes the law is the same. It is often said that in Scotland the movable property of both husband and wife becomes a kind of joint-stock property, called *goods in communion*, but this phrase has no meaning except with reference to the division of the property after the death of one of the parties or upon the dissolution of the marriage. The husband is, as in England, entire master, except that he cannot bequeath the entire property away from the wife. The wife's movable property becomes the husband's, and her heritable property remains subject to the husband's life rent. When she disposes of her heritable property, she must ratify the deed by going before a magistrate and acknowledging that she acts of her own free will. When the husband deserts her, she may, as in England, obtain a judge's order to protect her earnings and moneys, and she has a preferable right to a reasonable provision out of any property to which she may succeed (Conjugal Rights Amendment Acts, 1861 and 1874). By the Married Women's Property (Scotland) Act, 1877, the produce of a wife's industry or skill is excluded from the rights of her husband, and his liability for her antenuptial debts is restricted to the amount she brought into the marriage. A wife has in Scotland the power to bind her husband for necessities, but the husband can, by a process of inhibition, give notice to tradesmen not to supply her at his expense, and this notice will be binding on all the King's subjects.

Community Property Occupying an intermediate ground between the common law and the civil law relating to the husband and wife is the law of community property. The notion of a community of interests by husband and wife in all property acquired during the coverture seems to have been derived from the civil law and the mediæval customary law and is now incorporated into the Code Napoléon and most of the other European codes as fixing the rights of husband and wife in the absence of contract. The most important peculiarity of community property is the partnership of husband and wife in all property acquired by them during the coverture, and under some systems in property acquired before the marriage. The husband is the *curator* of the wife, who has no power to contract independently of his authority, but she retains her joint interest in the community property and, after her husband's death, is entitled to one-half the community property, the other half passing to the heirs. The husband has the same right in case of the wife's death. See *COMMUNITY OF PROPERTY*.

For the particular doctrine of community property belonging to the Spanish law and adopted in New Mexico and to some extent in Arizona, California, Nevada, Idaho, Texas, and Washington, see *GANANCIAL SYSTEM*. Consult *The Commentaries of Kent and Blackstone*. Hammick, *Marriage Laws of England* (2d ed., London, 1887), Macqueen, *Rights and Liabilities of Husband and Wife* (4th ed., ib., 1905),

Schouler, *Domestic Relations*, the statutes of the various States in the United States, and the authorities referred to under DOMESTIC RELATIONS

HUSBANDRY, PATRONS OF See GRANGE

HUSBANDS, hūz'bandz, HERMAN (c-1795) An American Revolutionary agitator. He was born in Pennsylvania, but settled in North Carolina and was a member of the Legislature of that Colony. In 1768 he became one of the leaders of the Regulators (qv), an organization formed to redress grievances. After several times coming into conflict with Governor Tryon, at last, in 1771, his force of 2000 Regulators was defeated, and Husbands fled from the Colony, settling near Pittsburgh. He was a member of the Pennsylvania Legislature in 1778 and at the time of the Whisky Insurrection (qv) of 1794 was a member of the Committee of Safety with Albert Gallatin and others.

HUSCHKE, hush'ke, GEORG PHILIPP EDUARD (1801-86). A Prussian jurist, born at Münden and educated at the universities of Göttingen and Berlin. At Göttingen he was made instructor in Roman law (1821). Afterward he was professor of law at Rostock (1824) and at Breslau (1827). He took a prominent part in ecclesiastical politics and was so strong a partisan of the Lutheran communion that his opponents brought an unsuccessful criminal suit against him for inciting an insurrection (1835). In 1838 he was at the head of the court of arbitration at Breslau. Later he held high ecclesiastical offices in the gift of the state and was made Privy Councillor. As a jurist, he combined the historical and philological methods. His more important works are *Studien des römischen Rechts* (1830), *Die Verfassung des Königs Servius Tullius* (1838), *Ueber den Census und die Steuerverfassung der frühern römischen Kaiserzeit* (1847), *Gaius, Beiträge zur Kritik und zum Verständnis seiner Institutionen* (1855), *Jurisprudentiæ Antequintianæ quæ Supersunt* (5th ed, 1886), and the valuable works on the Italian dialects, *Die oskischen und sabellischen Sprachdenkmäler* (1856), *Die Iguvischen Tafeln nebst den kleinern umbrischen Inschriften* (1859); *Zu den altitalienischen Dialecten* (1872), *Die neue oskische Bleitafel* (1880).

HUSEMANN, hūz'e-man, THEODOR (1833-1901). A German pharmacologist, born in Detmold and educated at Göttingen, Würzburg, Berlin, and Prague. He practiced medicine for five years and in 1860 went to Göttingen, where he became docent (1865) and professor (1873) of pharmacology and toxicology. From 1881 to 1883 he was a member of the German Pharmacopœic Commission. He wrote *Handbuch der Toxikologie* (1862-67) and *Die Pflanzenstoffe in chemischer, physiologischer, pharmakologischer und toxikologischer Hinsicht* (1871), both with his cousin AUGUST (1833-77), who was professor at Chur, contributed to Maschka's *Handbuch der gerichtlichen Medizin* (1882) and to the Penzold Stintzang *Handbuch der speziellen Therapie* (1895), and wrote a *Handbuch der gesamten Arzneimittellehre* (3d ed, 1872) and a study on the pharmacopœias of the sixteenth century, *Die kölnischen Pharmakopœen und ihre Verfasser* (1899).

HUSH, hush. See HUSI

HUSH MONEY. In English law, money or other property given or offered to another for the purpose of inducing the latter to refrain

from prosecuting a criminal offense or from giving evidence against a person accused of crime. The giving or offering of hush money is not a penal offense at common law, unless it amounts to subornation of perjury, but the transaction is illegal as being contrary to public policy and morality, and no contract based on an agreement or promise to suppress a criminal prosecution or to conceal crime is enforceable at law or equity. However, a person agreeing for a consideration not to prosecute a felony is guilty of the crime of compounding a felony and may be punished by penal servitude. See COMPOUNDING OF FELONY.

HUSI, hū'sā, Rum pron hūsh, or **HUSH**. The capital of the Rumanian District of Falcu, Moldavia, situated a short distance west of the Pruth and 38 miles south-southeast of Jassy (Map Balkan Peninsula, G 1). It has a fifteenth-century cathedral and a theological seminary. Pop. 1889, 12,660, 1899, 15,484.

HUSKISSON, WILLIAM (1770-1830). An English statesman and financier. He was born at Birch Moreton, Worcestershire, March 11, 1770, and in 1783 was sent to Paris to study medicine. He took part in the storming of the Bastille and as a member of the Club of 1789 delivered before his associates a speech on the currency. After his return to England in 1792 he received a subordinate appointment under the Tory government and formed an intimate acquaintance with Pitt and Canning. As Undersecretary of State for War (1795-1801), he did most of the work of that office. In 1796 he entered Parliament for Morpeth and, with the exception of two years, remained a member for various constituencies to his death. He held several offices under Pitt, with whom he retired in 1801. In 1804 he was appointed Secretary of the Treasury in the new Pitt cabinet, and on Pitt's death in 1806 he lost his office, but was restored to it by Mr Perceval in 1807. In 1814 he was made Chief Commissioner of the Woods and Forests, in 1823 President of the Board of Trade, and in 1827 Secretary of State for the Colonies. Through his exertions the old restrictions on the trade of the Colonies with foreign countries were removed. He also obtained the removal or reduction of many import duties, considerable relaxation of the navigation laws, and is in fact mentioned as the great pioneer of free trade. His death (Sept 15, 1830) was caused by injuries received that day at the opening of the Liverpool and Manchester Railway. Consult *Speeches*, with biographical memoir (3 vols, London, 1831)—from the comprehensive views which they exhibit, as well as from their full and accurate details, these speeches are valuable to students of political economy, Hansard, *Parliamentary Debates* (ib, 1821-28), J Wright, *Life* (ib, 1831), F C Greville, *Memoirs of the Reigns of George IV and William IV* (1st series, New York, 1875).

HUSS, HENRY HOLDEN (1862-) An American composer, born in Newaick, N J. He studied first with his father, George J Huss, and in 1882 entered the Munich Conservatory, Germany, taking up the study of counterpoint, composition, and instrumentation, and the organ under Rheinberger. During his stay in Germany he studied the pianoforte under Giehl and conducting under Abel. In 1885 he became a resident of New York and subsequently became well known throughout the country as a

composer, pianist, and teacher. His compositions include a scena for soprano and orchestra (*Cleopatra's Death*), a concerto for piano a concerto for violin, songs, part songs, and chamber music.

HUSS, or **HUS**, **JOHN** (c 1370–1415). A Bohemian religious reformer. He was born at Husinec (or Husinec), Bohemia, northwest of Budweis. His baptismal name was Jan, from his birthplace he was called Johannes de Husynecz, or, in English, John Huss. The day and year of his birth are unknown. His parents were Czech peasants. He studied at the University of Prague, where he soon made a reputation for scholarship, became M.A. (1396), university lecturer (1398), dean of the philosophical faculty (1401), and was rector in 1402 and 1403. In philosophy he was a realist. He became a priest in 1401. Owing to the marriage in 1382 of Anna, sister of King Wenceslas, to King Richard II of England, there was much intercourse between Bohemia and England. So the writings of the great English theologian, Wiclif (died 1384), came into Bohemia. Huss read them eagerly and availed himself of permission to lecture upon them in the university. He went further and translated them into Bohemian, and the world has given Huss credit for writings which were merely translations from Wiclif. He also defended Wiclif's opinions, not only in the lecture room, but from the pulpit. As he was a very popular preacher in the Bethlehem Chapel in Prague, and confessor to the Queen and a scholar of high repute, this stand attracted wide attention.

Wiclif had, however, not escaped the charge of heresy, and so in 1403 Huss was forbidden by the university authorities to discuss 45 sentences or theses which he had derived mostly from Wiclif, and in 1409, when the Pope, Alexander V, had issued his bull against the teachings of Wiclif and the Archbishop of Prague had burned Wiclif's writings, Huss felt the effect of the opposition he had stirred up on the part of the hierarchy, the priests, and the monks by denouncing, in imitation of Wiclif, the corruption of the Church. In 1410 he and his followers were excommunicated, and in the following year the decree was confirmed by the Pope. Undeterred, he kept on preaching as before. In 1411 Pope John XXIII proclaimed a crusade against King Ladislas of Naples and promised indulgences to the volunteers. Huss the next year gave out a university debate upon the question of indulgences, which only widened the breach between himself and the university authorities and the clergy. In 1412 a papal interdiction was issued against him. In reply he wrote his book *On the Church*, again drawing heavily from Wiclif, and appealed from the Pope to a general council and to Christ, and then, feeling no longer safe in Prague, he withdrew to the castles of certain friendly noblemen. In 1414, obedient to a summons, but under the protection of King Wenceslas, who had continually befriended him, and with a safe-conduct to go to Constance, given by the Emperor Sigismund, he went to the general council which had been convened in Constance.

His journey thither was a triumph, and he entered the city (November 3) in great state. At first he was a free man, but on November 28 he was apprehended and charged with having made an attempt to leave the city, and cast into prison, in spite of the indignant protests of the

Bohemian and Polish nobles. He may have fancied that he would have opportunity to defend his views in open debate, but he quickly learned that the council intended to try him as a heretic. He was, however, long kept in suspense, for it was not till June 5, 1415, that he was first formally accused. On June 8, 39 charges were exhibited against him, some of which he acknowledged as fairly based upon his teachings, while others he declared to be misrepresentations. Being required to recant his alleged errors he refused to do so until they should be proved to be errors and claimed that he had not departed from Catholic doctrine, though he expressed admiration for Wiclif. On June 18 the articles of his condemnation were prepared, on June 24 his books were burned, on July 1 his attempts to come to an understanding with his prosecutors failed, and on Saturday, July 6, he was condemned to be burned at the stake for heresy. The same day the sentence was executed, and the martyr's ashes were thrown into the Rhine. The Emperor, though present, did not interfere, since heretics had no claim to protection. The death of Huss caused sorrow and indignation throughout Bohemia and led to the so-called Hussite War. See **HUSSITES**.

A critical edition of Huss's writings, distinguishing between his own works and his translations from Wiclif, is lacking. The best we have is F. Palacký's *Documenta Magistri Joannis Hus* (Prague, 1869). The works of Huss in Bohemian were published by K. J. Eiben (Prague, 1865–68). E. de Bonnechese published a French translation of his letters (Paris, 1846), from which an English translation was made (London, 1846). F. B. Mikowec prepared one in German (Leipzig, 1869). Nowotny began a German translation of his sermons (Görlitz, 1855). For his biography, consult E. H. Gillett (Boston, 1863–64), A. H. Wratislaw (London, 1882), F. H. H. Lutzow, *Life and Times of Master John Hus* (New York, 1909), for his relations to Wiclif, Loserth, *Wiclif and Huss* (trans., 1b, 1884), H. C. Lea, *History of the Inquisition*, vol. viii (1b, 1888). See references of **CONSTANCE**, **COUNCIL OF**.

HUSSARS, húsz-zász. Light cavalry. Originally a distinct type of Hungarian mounted troops, receiving their name, it is said, from the circumstance of their origin, Matthias Corvinus having in 1458 raised a body of cavalry to operate against the Turks by taking one man out of every 20 inhabitants, hence the use of the word "husz-ár," in Hungarian, *the twentieth*. The demand for cavalry possessing greater mobility than the dragoons, as yet the only type, led to the formation of light-cavalry regiments on the hussar model. Nearly two-thirds of the entire cavalry strength of Great Britain consists of hussar and lancer regiments, the general proportion throughout Europe being almost as great. The original Hungarian hussars had several peculiarities of dress and equipment, the most conspicuous of the former being a loose jacket suspended in part from the shoulders—a feature still preserved in several countries. See **CAVALRY**.

HUSSEIN AVNI PASHA, hus-sân' av-né pa-sha' (1819–76). A Turkish general and statesman, born at Dost-Koç, near Isparta, in western Asia Minor, and educated after his sixteenth year in Constantinople. In 1853 he entered the general staff under Omar Pasha, with the rank of lieutenant colonel, and with him di-

rected the fortification of the Balkan passes. He commanded a division in the war with Montenegro (1859-60), became general in chief of the guard (1864), and in 1867-69 put down the rising in Crete. As a reward for this service, he was made Minister of War, from which post he was retired in 1871, after the death of Ali Pasha, his protector. In 1872, on the accession of Midhat Pasha to the grand-viziership, he returned to Constantinople from his exile at Isparta, became Grand Vizier in 1874, and Governor of Smyrna in 1875. In the same year, after a journey through France and England, he was again Minister of War for six weeks, and in May, 1876, was a leader in the plot which deposed Abdul Aziz and put Amurath V on the throne. Less than a month later he was assassinated by an officer, Hassan Bey, at a ministerial meeting.

HUSSEIN KEMAL (kə-mal') **PASHA**, PRINCE (c1850-) The first Sultan of Egypt after the declaration (December, 1914) of a British protectorate over that country. A son of Ismail Pasha (qv), Viceroy from 1863 to 1879, and eldest living prince of the family of Mehemet Ali (qv), he succeeded his nephew, Abbas Hilmi, who was deposed by the British because he had sided with Turkey in the European War. (See WAR IN EUROPE.) Hussein Kemal was unusually well educated, in Egypt and in Paris, where he was intimate in Napoleon III's family. He left the capital upon the overthrow of the monarchy (1870) and afterward held a number of posts in Egypt—Inspector of Upper and Lower Egypt, Minister of Public Instruction, of Public Works, of the Interior, of War, and of Finance. Thus especially fitted by varied service, he was installed as Khedive, with the title of Sultan, Dec 19, 1914.

HUSSEIN NAZIM PASHA, hus-sān' na'-zem pa-sha' (1848-1913). A Turkish soldier and public official, born at Constantinople. He completed his military education at Saint-Cyr, Paris, and during the Russo-Turkish War rose to chief of staff. While in prison for a five-year term because of his political activities, he continued his studies of military science, and when he finally escaped he hastened to join the Young Turks in the revolution of 1908. He was appointed to the command of the Second Army Corps at Adrianople, where he greatly strengthened the fortifications. In 1909 he became Minister of War under Kiamil Pasha, but, having antagonized the Young Turks, soon gave up the office. Later, as Governor-General (vali) at Bagdad, he accomplished important reforms and improved public property. In 1911 he was appointed president of the army council and in 1912 Minister of War in the cabinet of Mukhtar Pasha. After the defeat of Lule Burgas he commanded the Turkish forces in person, conducting the defense along the Tchatalja lines with great energy. (See BALKAN WAR.) He was assassinated by the Young Turk conspirators in the coup d'état of 1913.

HUS/SITES. The followers of John Huss (qv). Honoring him as a martyr, about 450 Bohemian nobles formed a league, protesting against the action of the Council of Constance which had condemned Huss to be burned and bidding defiance to decrees of bishops and the Pope. The symbol of their confederacy was the cup, the use of which in the Lord's Supper they extended to the laity, as had already been done with the approbation of Huss. King Wenceslas

of Bohemia was constrained to grant them the use of many churches. After his death (August, 1419) the majority refused to recognize as King his brother, the Emperor Sigismund (qv), who had broken his safe-conduct given to Huss. The so-called Hussite war was followed. For eight years (1420-27) the Hussites, led by their generals Ziska (qv) and Procopius (qv), were victorious against the forces sent against them by the Emperor and the Pope, and in 1429 and 1430 they carried terror into the countries of Germany bordering on Bohemia. Convents and churches were reduced to ashes, and priests and monks were slain. From the beginning the Hussites had included two parties—the more conservative, called Calixtines (qv), or Utraquists, from their use of the cup in the Lord's Supper, who were more in sympathy with the Church and hoped for an ultimate reconciliation, and the radical, called Taborites (qv), who went much further in rejecting doctrines and practices of the Church. A third faction, intermediate between the two, called Orphans, also developed. In 1431 the Council of Basel (qv) undertook to conciliate the Hussites and succeeded in coming to an agreement with the Calixtines by the "Compactata of Prague," signed in 1436, after which the latter acknowledged Sigismund as King and made peace with the Church. The Taborites and Orphans were completely defeated in a battle near Bohmischbrod, May 30, 1434, and soon disappeared as a political power, but continued to exist as the Bohemian Brethren (qv). Consult Ernest Denis, *Huss et la guerre des Hussites* (Paris, 1878), and Lutzow, *Bohemia* (London, 1896).

HUSTINGS (AS *hūsting*, from Icel *húsping*, council place, from *hūs*, AS, OHG *hūs*, Ger. *Haus*, house + *ping*, thing, assembly, OHG *ding*, Ger. *Ding*, thing, connected with Goth *þeihs*, Lat. *tempus*, time). An English term applied to the place or platform where, before 1872, members of Parliament were nominated for election, or from which a candidate addressed his constituents. The term is still applied to any electioneering platform. A court of hustings formerly existed in many English cities for the trial of suits brought for the recovery of land situated within the city limits. Such a court still survives in London, but its authority, which at one time extended to all actions between citizens, has now practically disappeared. The hustings court existed in the towns of Virginia founded during the eighteenth century. Thus, the charter of Norfolk Borough, incorporated in 1736, established a hustings court to be held once a month, with jurisdiction over actions of ejectment, trespass, and writs of dower, as well as all other actions, personal and mixed, involving not more than £20. A hustings court is still one of the municipal tribunals of Richmond. It is held by a judge elected in the same manner as the circuit judges and has original and exclusive jurisdiction of most criminal offenses committed within the city limits.

HUTCHESON, FRANCIS (1694-1746). A moralist of the eighteenth century, born Aug. 8, 1694, in County Down, Ireland. His father was a Presbyterian minister. He studied for the Church at the University of Glasgow, but after a short term of preaching he was induced, in 1719, to open a private academy in the city of Dublin, which proved highly successful. In 1725 he published his *Inquiry into the Original of our Ideas of Beauty and Virtue*, etc.,

which was the means of introducing him to the notice of many influential personages, such as Archbishops King and Boulter, and Lord Granville, then Lord Lieutenant of Ireland. This work was followed, in 1728, by his *Essay on the Nature and Conduct of the Passions and Affections*, and in the year after he was appointed professor of moral philosophy in the University of Glasgow. Here he died, in 1746. His largest and most important work, *A System of Moral Philosophy*, was published at Glasgow in 1755 by his son, Francis Hutcheson. From the period of Hutcheson's lectures, according to Dugald Stewart, may be dated the metaphysical philosophy of Scotland. But it is as a moral philosopher, rather than as a metaphysician, that Hutcheson is noteworthy. His system is, to a large extent, that of Shaftesbury, but it is more complete, coherent, and clearly illustrated. Hutcheson emphasized the importance of "calm benevolence" and was a strong opponent of the doctrine that it has a selfish origin. Equally important with benevolence in his system is the moral sense, "which does not impel towards good actions, but merely judges the moral quality of actions and gives its approval to benevolence." The latter is the mainspring of good conduct. All action prompted by benevolence is formally good, but to be materially good it must be an action which "procures the greatest happiness for the greatest numbers." In this respect he was a forerunner of the English utilitarians. Consult Thomas Fowler, *Shaftesbury and Hutcheson* (London, 1882), James Maitnean, *Types of Ethical Theory* (Oxford, 1886), W. R. Scott, *Francis Hutcheson* (New York, 1901), Ernest Albee, *History of English Utilitarianism* (ib., 1902).

HUTCHINS, HARRY BURNS (1847-) An American university president, born at Lisbon, N. H. In 1871 he graduated from the University of Michigan, where he was instructor and assistant professor of history and rhetoric (1872-76), Jay professor of law (1884-87), professor of law and dean of the department of law (1895-1910), acting president (1897-98 and 1909-10), and president after 1910. He served as professor of law at Cornell University in 1887-94. In 1882-83 he revised and annotated the *Michigan Supreme Court Reports* (5 vols.), edited the American edition of *Williams on Real Property*, and is author of a biography of Thomas M. Cooley in the *Great American Lawyers Series*.

HUTCHINS, THOMAS (1730-89) An American geographer. He was born in Monmouth Co., N. J., entered the British army at an early age, and participated in the French and Indian War. Being in London in 1779, he was imprisoned on suspicion of favoring American independence, but he escaped by way of France, went to Charleston, S. C., entered the Continental army, and was appointed geographer general by General Greene. He was the author of several geographical works, including the important *Topographical Description of Virginia, Pennsylvania, Maryland, and North Carolina* (1778), printed, with biographical and bibliographical matter by F. C. Hicks, Cleveland, 1904) and *History, Narrative and Topographical Description of Louisiana and West Florida* (1784). He lived for several years in Louisiana, and this latter volume is valuable for the reports of the last years of Spanish régime in the vicinity.

HUTCHINSON A city and the county seat

of Reno Co., Kans., 219 miles by rail west of Kansas City, Mo., on the Arkansas River, and on the Atchison, Topeka, and Santa Fe, the Chicago, Rock Island, and Pacific, and the Missouri Pacific railroads (Map Kansas, D 6). It is in the fertile Arkansas valley, has an extensive trade in grain, and is a jobbing centre for a wide territory, having several wholesale houses. There are important manufactures of salt, soda ash, and straw board, and large flouring mills. Hutchinson is a popular city for conventions, is the home of the Kansas State Fair, and among the features of the city are Convention Hall, Glendale and Northside parks, the State Industrial Reformatory, the grounds of which cover 640 acres, and the courthouse and public-library buildings. Founded in 1871, Hutchinson was incorporated two years later, and in 1909 adopted the commission form of government. Pop., 1900, 9379; 1910, 16,364; 1914 (U. S. est.), 19,339.

HUTCHINSON, ANNE (c. 1590-1643) A religious enthusiast, of American celebrity, born in Lincolnshire, England, 1590 or 1591. She was a daughter of Rev. Francis Marbury, married William Hutchinson, 1612, and emigrated to Boston, Mass., in 1634. Living in a community prone to religious excitement, she claimed to be a medium of divine revelation and held meetings for women and later for both sexes, in which she set forth the doctrine that those who were in the covenant of grace were not under the covenant of works. This was considered as Antinomian by the state clergy and likely to have sad practical consequences. Great controversies arose, and a synod was called, in which her teachings were condemned, and she was banished from the Colony. She and her friends now obtained from the chief of the Narraganset Indians liberty to reside in Rhode Island, where they purchased the island of Aquidneck and set up a community on the highly commendable principle that no one was to be "accounted a delinquent for doctrine" (1638), calling the name of the town Portsmouth. After the death of her husband (who shared her opinions), in 1642, she removed to the west of Stamford, Conn., which was then Dutch territory, and there in September, 1643, she and her whole family of 15 persons were taken prisoners by the Indians, and all but one daughter murdered. She seems to have been a woman of extraordinary ability and independence of thought, against whom the most serious charge was that her teachings might produce harm in others. Consult Jared Sparks, "Anne Hutchinson," in *Library of American Biography*, vol. xvi (2d series, Boston, 1845), and C. F. Adams, *Three Episodes in Massachusetts History* (2 vols., Boston, 1893).

HUTCHINSON, JOHN HELY- and **SIR WALTER F. HELY-** See HELY-HUTCHINSON.

HUTCHINSON, JOHN (1615-64) An English regicide, born in Nottingham and educated at Cambridge. After a short study of the law at Lincoln's Inn, he identified himself with the Parliamentary side in the struggle against the King, became a member of the committee for Nottinghamshire, and throughout 1644 and 1645 acted as Governor of both Nottingham and Nottingham Castle, successfully holding them against repeated Royalist attacks, attempted bribery, and internal dissensions. In 1646 he succeeded his father, Sir Thomas Hutchinson, as a member of the Long Parliament, and two years afterward he sat as one of the King's judges and

signed the royal death warrant. He served under Cromwell in the Council of State until 1653, when he retired from politics and refused further office under the Protector. He seems to have worked for a restoration of the Long Parliament, and during its short session, from May to October, 1659, he returned to his seat. He was a member from Nottingham to the Convention Parliament in 1660, but was immediately expelled as a regicide, though his life was spared through the intercession of relatives. In 1663 he was arrested as an accessory to the Yorkshire Plot and, despite meagreness of evidence against him, was imprisoned in the Tower. In May, 1664, he was removed to Sandown Castle in Kent, where he died from fever in the following September. Hutchinson represented the nobler type of Puritanism. His wife Lucy (1620-c 1680) was very influential in saving his life when the Restoration took place, and after his death wrote his life. Consult Lucy Hutchinson, *Memoirs of the Life of Colonel Hutchinson, to which are Added the Letters and Other Papers*, revised by C. H. Firth (2 vols, London, 1885), and C. H. Firth, in *Dictionary of National Biography*, vol. xxviii (1b, 1891).

HUTCHINSON, JOHN (1674-1737) An English theological writer. He was born at Spennorthorne, near Middleham, in Yorkshire. For some time he was steward of the household of the Duke of Somerset and left his service to devote himself to religious studies, the Duke procuring for him a sinecure appointment from the government. In 1724 he published the first part of a work called *Moses' Principia*, in which he defended what he regarded as the Mosaic cosmogony and assailed Newton's theory of gravitation. He continued to publish a succession of works till his death, in London, Aug. 28, 1737. The leading principle of his system is that the Holy Scriptures contain the elements not only of true religion but of all rational philosophy, which, however, was to be derived only from the original unpointed Hebrew text, which he subjected to strange fanciful processes. His works at one time exercised a considerable influence, and his followers, called Hutchinsonians, included some persons of considerable learning and celebrity. His works appeared in 12 volumes (London, 1748), with life by Spearman in supplement (1b, 1765).

HUTCHINSON, JOHN IRWIN (1867-) An American mathematician, born at Bangor, Me. He was educated at Bates College, Lewiston, Me. (A.B., 1889), at Clark University (1890-92), and at the University of Chicago (Ph.D., 1896). At Cornell University he was instructor in mathematics from 1894 to 1902, assistant professor in 1903-09, and professor after 1910. He is coauthor with Virgil Synder of *Differential and Integral Calculus* (1902) and *Elementary Treatise on the Calculus* (1912). He published also reviews chiefly on hyperelliptic, theta, and automorphic functions, on algebraic surfaces, and on birational transformations.

HUTCHINSON, SIR JONATHAN (1828-1913) An English surgeon, born at Selby, Yorkshire. He received his training at St. Bartholomew's Hospital (1850-54). At the Royal College of Surgeons he was professor of surgery and pathology in 1877-82 and president in 1889-90, and he was president of the Hunterian (1869-70), Pathological (1879-80), Ophthalmological (1883), Neurological (1887), Medical (1890), and Royal Medical and Chirurgical (1894-96)

societies, and was a member of royal commissions on smallpox hospitals (1884) and vaccination (1890-96). He announced in 1862 his discovery that a certain form of eye disease in children was due to hereditary syphilis. He is also known for his researches on leprosy and for his association of that disease with the eating of salt fish. He edited the *Archives of Surgery* and published *Syphilis* (1887, new ed., 1910) and *On Leprosy and Fish-Eating* (1906).

HUTCHINSON, THOMAS (1711-80) An American Loyalist, the last royal Governor of the Province of Massachusetts Bay. He was born Sept. 9, 1711, in Boston, where his father, the great-grandson of Anne Hutchinson (qv), was a wealthy merchant and shipowner. He graduated at Harvard in 1727, entered his father's countingroom, early showed remarkable aptitude for business, and by the time he was 24 had accumulated considerable property in trading ventures on his own account. The social prominence of his family, as well as his own position in the business world, made him, while still a young man, a person of considerable importance in the community. In 1737 he was elected a member of the Boston board of selectmen. Later in the same year he was chosen a representative to the General Court of the Colony and at once took a strong stand in opposition to the views of the majority with regard to a proper currency. His proposal to borrow silver in England to redeem the outstanding bills of credit and his opposition to the revival of the land bank made him unpopular with the people and impelled his constituents in town meeting to draw up "instructions," disregard of which led to his retirement in 1740. In that year he went to England as a commissioner to represent Massachusetts in a boundary dispute with New Hampshire. In 1742 he was reelected to the General Court and was thereafter chosen annually until 1749, serving as Speaker from 1746 to 1749. He continued his advocacy of a sound currency, and when the British Parliament reimbursed Massachusetts in 1749 for the expenses incurred in the Louisburg expedition, he proposed the abolition of the bills of credit, and the utilization of the parliamentary repayment as the basis for a new Colonial currency. The proposal was finally adopted by the Assembly, and its good effect on the trade of the Colony at once established Hutchinson's reputation as a financier. On leaving the General Court he was appointed at once to the Governor's Council, in 1750 he was chairman of a commission to arrange a treaty with the Indians in the District of Maine, and he served on boundary commissions to settle disputes with Connecticut and Rhode Island. In 1752 he was appointed judge of probate and a justice of the Common Pleas. In 1754, as a delegate from Massachusetts to the Albany Convention (qv), he took a leading part in the discussions, and favored Franklin's plan for Colonial union, although doubting its practicability. In 1758 he was appointed Lieutenant Governor, and in 1760 Chief Justice, of the Province. In the following year, by issuing writs of assistance (qv), he brought upon himself a storm of protest and criticism. His distrust of popular government as exemplified in the New England town meeting increased. Although he opposed the principle of the Stamp Act (qv.), considered it impolitic, and later advised its repeal, he accepted its legality, and, as a result of his stand, his city house was

sacked by a mob in August, 1765, and his valuable collection of books and manuscripts destroyed. In 1769, upon the resignation of Governor Bernard, he became acting Governor, serving in that capacity at the time of the Boston Massacre (qv), March 5, 1770, when popular clamor compelled him to order the removal of the troops from the city. In March, 1771, he received his commission as Governor. His administration, controlled completely by the British ministry, increased the friction with the patriots. The publication, in 1773, of some letters on Colonial affairs written by Hutchinson, and obtained by Franklin in England, still further aroused public indignation, and led the ministry to see the necessity for stronger measures. The temporary suspension of the civil government followed, and General Gage was appointed military governor in April, 1774. Driven from the country by threats in the following May and broken in health and spirit, Hutchinson spent the remainder of his life an exile in England. There, still nominally Governor, he was consulted by Lord North in regard to American affairs, but his advice that a moderate policy be adopted, and his opposition to the Boston Port Bill, and the suspension of the Massachusetts constitution, were not heeded. His American estates were confiscated, and he was compelled to refuse a baronetcy on account of lack of means. He died at Brompton, now a part of London, June 3, 1780. He wrote a *History of Massachusetts Bay* (vol. 1, 1764, vol. 11, 1767; vol. 111, 1828), a work of great historical value, calm, and judicious in the main, but entirely unphilosophical and lacking in style. His *Diary and Letters* was published in 1884-86. Consult J. K. Hosmer, *Life of Thomas Hutchinson* (Boston, 1896), and the chapter "Thomas Hutchinson, the Last Royal Governor of Massachusetts," in John Fiske, *Essays, Historical and Literary*, vol. 1 (New York, 1902).

HUTCHINSON, THOMAS JOSEPH (1820-85). A British explorer, born at Stonyford, Ireland. He studied medicine and, after a trip to West Africa in 1851, was chief surgeon on the Niger expedition (1854-55). After two years as English Consul at the Bight of Biafra and Fernando Po, he became Governor of the latter place (1857) and in 1861 was transferred to the consulate at Rosario in Argentina, where a year later he took part in the Salado expedition. In 1870 he was appointed Consul at Callao and three years later retired to his Irish property. He wrote *Narrative of the Niger Tshadda Binue Exploration* (1855), *Impressions of Western Africa* (1858), *Ten Years' Wandering among the Ethiopians* (1861), *Buenos Ayres and Argentine Gleanings* (1865), *Parana and South American Recollections* (1868), *Two Years in Peru* (1874), *Summer Rambles in Brittany* (1876).

HUTCHINSON, Woods (1862-) An American physician, born at Selby, Yorkshire, England. He graduated from Penn College, Oskaloosa, Iowa, in 1880 and (M.D.) from the University of Michigan in 1884, was professor of anatomy at the State University of Iowa (1891-96), professor of comparative pathology at the University of Buffalo (1896-1900), and State health officer of Oregon (1903-05), and lectured at the London Medical Graduates' College and the University of London in 1899-1900. In 1905 he became professor of clinical medicine at the New York Polyclinic. He edited

Fis Medicatrix (1890-91) and *The Polyclinic* (1899-1900), and is author of *The Gospel According to Darwin* (1898), *Studies in Human and Comparative Pathology* (1901), *Instinct and Health* (1908), *Preventable Diseases* (1909), *Conquest of Consumption* (1910), *Exercise and Health* (1911), *The Child's Day* (1912), *Common Diseases* (1913), *Civilization and Health* (1914).

HUTCHINSONIANS. See HUTCHINSON, JOHN (1674-1737).

HUTCHINSON, JOHN (1832-1910). A Scottish sculptor, born in Edinburgh. He began there as a wood carver, but attended the art school at the same time, and in 1860 and 1863 studied at Rome. He first exhibited in 1856 at the Royal Scottish Academy, of which he became member in 1867, librarian in 1877, and treasurer in 1886. Apart from ideal subjects in marble and bronze, such as "Hamlet," "Don Quixote," and "Dante," he modeled statues of Robert Bruce, John Knox (a colossal bronze in Edinburgh), George Buchanan, Regent Murray, "Hal-o'-the-Wynd," "Floira Mac Ivoi" for the Scott monument in Edinburgh, and busts of Harold Hardrada, Norman McLeod, Queen Victoria (by command), the Prince Consort, and many other distinguished personages. In the National Gallery at Edinburgh are the busts of Robert Scott Lauder, R.A., "Pasquicia, a Roman Contadina," and "Marietta, a Roman Girl."

HUTH, HUTH, HENRY (1815-78). An English merchant and bibliophile, born in London. He was educated in the classics and also in Persian, Arabic, and Hindustani. He entered his father's business in 1833, but later traveled in Germany, France, the United States, and Mexico, and in 1849 rejoined his father's firm. He collected a large library, containing very many rare books, of which a catalogue was published in 1880.—His son, ALFRED HENRY HUTH (1850-1910), inherited his father's library, to which he added largely. He also wrote a biography of his father's friend, Henry Thomas Buckle, and *Marriage of Near Kin* (1875). The library was sold at auction after A. H. Huth's death.

HUTIA, ḥṭ-tā (Sp, from the native name). A West Indian rodent or hog rat, of the family Octodontidae, differing from rats in having four grinders on each side in each jaw, with flat crowns. The tail is round and slightly hairy and is used for support in sitting erect, as by kangaroos, and for aid in climbing trees. They make much use of their forepaws as hands. They are closely allied to the coypu (qv), but are not aquatic and make their home in the woods. The best-known species is the hutia-couga (*Capromys pilorides*), of Cuba, which is about 22 inches long to the root of the tail. The fur is long, coarse, and yellowish brown, with the paws and ears blackish. Another Cuban species is the hutia-carabali (*Capromys prehensilis*), the tip of whose tail is prehensile. The hutia-couga is a skillful climber and lives in dense forests. Its food is chiefly fruits, leaves and bark, but it also eats the flesh of small animals, particularly that of a kind of lizard. It is easily tamed, and the Cubans consider its flesh a delicacy, for which reason it is much hunted by the natives. The smaller hutia-carabali is said to live chiefly in the tops of trees.

Jamaica has a short-tailed hutia (*Capromys brachyurus*) (see Plate of CAVIES, ETC.), locally called coney, which has become rare, and Ingham's hutia (*Capromys ingrahami*) inhabits

the Bahamas Consult Poey, *Memorias* (Havana, 1860-62)

HUTSCHENRUIJTER, hüt's-en-rí'tër, WOUTER (1859-) A Dutch composer and conductor, born in Rotterdam Having completed his musical education entirely under local teachers, he began his career as conductor of a choral society, at the same time teaching also at the conservatory In 1890 he was called to Amsterdam as second conductor of the famous Concertgebouw Orchestra This post he soon resigned to accept the conductorship of the Utrecht Orchestra By encouraging the younger Dutch composers in producing their works he exercised a strong and wide-felt influence on the musical life of Holland His own works for orchestra and chamber music are highly esteemed by his compatriots He also made a reputation as a writer through his biographies of R. Strauss (1898) and Weingartner (1906) and through an authoritative history of the orchestra, *Orkest en Orkestspeel na 1600* (1903)

HUTTEN, hut'ten, PHILIP VON (c1515-46). A German adventurer and relative of Ulrich von Hutten (q.v.) He was one of the 600 adventurers collected from all parts of Europe who went out under George Hohermuth (better known as George of Speyer) to conquer the Province of Venezuela, which had been granted by Emperor Charles V to the great Augsburg family of Welser (q.v.) When Hohermuth died, in 1540, Hutten became captain general, and the next year, in company with young Bartholomaeus Welser, eldest son of the head of the family, left Coro with a well-equipped force to seek the mythical El Dorado (q.v.) After wandering about for five years, the remnant of the expedition returned to Venezuela to find a new Governor in power Juan de Caravajal had been appointed by the Audiencia of Santo Domingo to preserve order in Venezuela, but, as the years went by with no news of Hutten and his followers, he began to feel secure in his position Consequently the return of the adventurers was anything but welcome to him When he saw how diminished they were in number, he thought to force from them an acknowledgment of his authority In this, however, he was unsuccessful, as he also was in an attempt to seize them In fact this last effort was well-nigh disastrous to himself, for he was wounded by Welser and forced to pledge the Germans safe passage to the coast Relying upon Caravajal's word of honor, the adventurers took no precautions against attack and were easily captured by the treacherous Spaniard, who, after keeping Hutten and Welser in chains for a time, had them beheaded Hutten seems to have been a man of higher character than most of those with whom he was associated He left a narrative of his adventures entitled *Zeitung aus Indien* (1785)

HUTTEN, hut'ten, ULRICH VON (1488-1523). A scholar, poet, and reformer of the German Renaissance, one of the most celebrated of the humanists He was descended from an ancient and noble family and was born at the castle of Steckelberg in Hesse, April 21 1488 At the age of 10 he was placed in the neighboring monastery of Fulda, but, disliking this mode of life, fled in 1605 to Cologne, where he met Hoogstraten Johannes Rhegius, and other scholars of the day In 1506 he came to Erfurt, but soon after rejoined Rhegius at Frankfurt-on-the-Oder, when the new university was opened there There he took his master's degree and

published his first poem In 1507 he followed Rhegius to Leipzig He was stricken down with the pestilence in the following year, but recovered, and at Wittenberg in 1511 published his *115 Versificatoria* During these years he led the life of a wandering poet, subsisting on the bounty of those who admired his talents or feared his mordant wit In 1512 he went to Pavia to study law He had been there only a short time when the city was plundered by the Swiss, and Hutten was deprived of all he possessed For a short time he served as a soldier in the Imperial army, but soon returned to Germany, where he boldly entered into a quarrel with the Duke of Württemberg, who had murdered a kinsman of Ulrich's, and brought about the Duke's punishment In the dispute between Reuchlin (q.v.) and the Dominicans Hutten came to the support of the former and displayed no small learning and great power of satire He went again to Italy in 1515, to take the degree of LL.D. and returned to his native country in 1517. He was crowned with the poet's laurel crown at Augsburg by the Emperor Maximilian, who conferred on him the honor of knighthood in this same year While in Italy, Hutten had become imbued with a fierce hatred for the papacy, which he bitterly attacked in his preface to an edition of Laurentius Valla's *De Donatone Constantini*, published in 1517 In the following year he accompanied his patron, Albert, Archbishop of Mainz, to the Diet of Augsburg, where Luther had his famous conference with Cajetan Subsequently he established a small printing press of his own and employed himself in putting forth pamphlets written in the German language violently attacking the Pope and the Roman clergy The Archbishop Albert denounced him at Rome, whereupon Hutten took sides with Luther, whom he had hitherto affected to despise Persecuted by his enemies, he availed himself of the protection of Franz von Sickingen, but was forced to flee from the latter's castle after a two years' residence (1520-22) Going to Basel, he was coldly received by Erasmus, who did not approve of his extreme measures, and a breach took place between the two men, culminating in a great literary quarrel which marred their subsequent lives From this time Hutten was compelled to adopt a wandering life He died Aug 23, 1523, on the island of Ufnau in the Lake of Zurich, where Zwingli had secured a living for him Hutten was more open in the expression of his opinions than any other man, probably, of his age. He did much to prepare the way for the Reformation and to promote it He was a master of the Latin language and excelled in satirical and passionate invective His literary life is generally divided into three periods (1) period of Latin poems (1509-16), (2) period of letters and orations (1515-17), (3) period of dialogues and letters in Latin and German (1517-23) In all he published some 45 different works, but his most noteworthy contribution to literature was his portion of the second part of the immortal *Epistolæ Obscurorum Virorum* (q.v.) Hutten's collected works, *Opera Omnia*, were published at Leipzig in seven volumes (1859-70) under the editorship of Bocking

Bibliography Among several biographies by German authors that by D. F. Strauss (6th ed., Bonn, 1895), abridged in English by Sturge (London, 1874), is especially to be recommended Consult monographs by Reichenbach (Leipzig,

1877), Schall (Halle, 1890), Szamatólski, *Ulrich von Hutten's deutsche Schriften* (Strassburg, 1891). A good brief sketch in English is D S Jordan, *Ulrich von Hutten, Knight of the Order of Poets* (Boston, 1910).

HUTTEN ZUM STOLZENBERG, tsumshōtō'sen-bēik, BARONESS VON (BETTINA VON HUTTEN) (1874-) An American novelist, daughter of John Riddle, of Erie, Pa. In 1897 she married Baron von Hutten, chamberlain of the King of Bavaria, but was divorced in 1909. She resided much abroad and traveled widely. *Pam* (1905), with the other novels in which the heroine of this book reappears, has perhaps most strongly commended Baroness von Hutten as a writer. In addition to *Pam*, her novels include *Violett* (1904), *Araley* (1904), *Pam Decides* (1906), *The One Way Out* (1906), *The Halo* (1907), *Beechy, or the Lordship of Love* (1909), *Kingsmead* (1909), *The Green Patch* (1910), *Sharrow* (1912), *Maria* (1914).

HUTTER, hüt'tēr, LEONARD (1563-1616). A German Lutheran theologian, born at Nellingen, near Ulm. He studied at the universities of Strassburg, Leipzig, Heidelberg, and Jena, and after lecturing at Jena for several years went to Wittenberg. He was one of the most resolute and influential representatives of the Lutheran faith and was known as Redonatus Lutherus. He attacked the Calvinist doctrines in his *Concordia Concors* (1614), which he wrote as an answer to Hospinian's *Concordia Discors* (1607).

HUTTON, hū't'n, ARTHUR WOLLASTON (1848-1912). An English clergyman, born at Spridlington and educated at Cheltenham College and at Exeter College, Oxford. He was rector in his native town in 1873-76, was then received into the Roman Catholic church by Cardinal Newman, but in 1898 returned to the Anglican church. He was a member of Newman's Oratorian Community in 1883 and from 1887 to 1899 was librarian of the National Liberal Club. He visited the United States and Canada in 1907-08. His writings include *Our Position as Catholics in the Church of England* (1872), a life of *Cardinal Manning* (1892), *Letters to Mr Asquith and Mr Balfour* (1894-95), *Ecclesia Discens* (1904).

HUTTON, CHARLES (1737-1823). A self-educated English mathematician, born at Newcastle-on-Tyne, of humble parentage. He received most of his education in a school at Jesmond, where at the age of 18 he became master. The number of pupils having increased, he in 1760 opened a mathematical school in Newcastle and also taught mathematics at the Head School of the city. Among his pupils was John Scott, afterward Lord Eldon, Chancellor of England. Hutton also worked as a surveyor, and in 1770 he was engaged by the city of Newcastle to draw up an accurate map of the city and the suburbs. He became professor of mathematics in the Royal Military Academy at Woolwich (1773) and the following year was made a fellow of the Royal Society. He made important contributions to the *Philosophical Transactions*, and in 1778 gained the Copley medal for his papers on "Force of Exploded Gunpowder" and "Velocities of Balls." He was appointed by the Royal Society to determine the mean density and mass of the earth. His report appeared in the *Philosophical Transactions* for 1778. In 1779 he was made foreign secretary of the Royal Society, but resigned in 1783. Owing to failing health, he resigned his professorship in 1807 and

was granted a pension of £500 a year. He was editor of the *Ladies' Diary* from 1774 to 1817. The most important of his works are, besides those mentioned above *The Diarian Miscellany* (1775), *Mathematical Tables* (1785), *Mathematical and Philosophical Dictionary* (1795), *A Course of Mathematics* (1798 and subsequent editions), *Recreations in Mathematics and Natural Philosophy* (4 vols, 1803), from the French of Montucla, "On Cubic Equations and Infinite Series," in the *Philosophical Transactions* for 1780.

HUTTON, EDWARD (1875-) An English writer, especially on Italy. He was born in London and was educated at Highgate School and at Blundell's. He early devoted himself to Italian literature, history, and art, and traveled on foot in Italy and Spain. Hutton edited Denistoun's *Dukes of Urbino* (1908) and Crowe and Cavalcaselle's *Painting in Italy* (1908-09). Among his own valuable writings are *The Cities of Umbria* (1905), *The Cities of Spain* (1906), *Sigismondo Malatesta* (1906), *Florence and Northern Tuscany* (1907), *In Unknown Tuscany* (1909), *Boccaccio* (1909), *Rome* (1909), *Siena and Southern Tuscany* (1910), *Perugia* (1911), *Venice and Venetia* (1911), *The Cities of Lombardy* (1912), *Highways and Byways in Somerset* (1913), *Ravenna* (1913), *The Cities of Romagna and the Marches* (1913), *England of my Heart* (4 vols, vol 1, *Spring*, 1914).

HUTTON, FREDERICK REMSEN (1853-) An American mechanical engineer, born in New York City. He graduated from Columbia College in 1873 and in 1876 from the Columbia School of Mines, where he became assistant and where he was professor of mechanical engineering from 1891 until his retirement in 1907. From 1899 to 1906 he was dean of the faculty of applied science. In 1892 he became associate editor of the *Engineering Magazine*, in 1893 an editor of *Johnson's Cyclopædia*, and in 1913 a contributor to the NEW INTERNATIONAL ENCYCLOPEDIA. From 1883 to 1906 he was secretary, and in 1907 president, of the American Society of Mechanical Engineers. Columbia University gave him the honorary degree of Sc D in 1904, and Rutgers College similarly honored him in 1913. In 1911 he was consulting engineer for the department of water, gas, and electricity of New York City, and has been chairman of the technical committee of the Automobile Club of America for many terms. He wrote reports on machine tools for the census of 1880, *Mechanical Engineering of Power Plants* (1897, 3d ed, 1909), *Heat and Heat Engines* (1899), *The Gas-Engine* (1903, 3d ed, 1908).

HUTTON, JAMES (1726-97). An eminent British geologist. He was born in Edinburgh and educated at the university in that city. After serving a year's apprenticeship in a law office he relinquished his plan of joining the legal profession and entered upon the study of medicine, taking courses at Edinburgh, Paris, and Leyden. In 1750 he returned to Scotland and for several years was engaged in agricultural pursuits. Upon removing to Edinburgh in 1768 he came in contact with Ferguson, Black, and other savants, who encouraged and directed his scientific investigations. The results of a long and careful research into geological processes were formulated in a paper entitled "Theory of the Earth," which he read before the Royal Society in 1785 and afterward amplified and pub-

lished as *The Theory of the Earth, with Proofs and Illustrations* (1795). This work, although attracting little notice at the time, established a place for its author among the foremost thinkers in the realm of geological science. One of the fundamental principles of Hutton's theory was based on the internal heat of the earth, which has shown itself in past ages by the intrusion of molten rocks into the crust and by upheaval of the superficial strata. This view was combated by the followers of Werner, but it is now generally accepted as correct. He further developed the principle that the study of geological phenomena should be based upon observation of changes going on at the present time and thus in a way originated the doctrine of uniformitarianism (q.v.), afterward elaborated and expounded by Lyell. He also realized very fully the enormous lapse of time which the changes involve in his view nature affords "no vestige of a beginning, no prospect of an end." Such doctrine was out of harmony with the scientific teachings of his age, but finds general acceptance with the leading geologists of the present day. The great value of Hutton's work was not fully appreciated until several years after his death, when Playfair brought out the "Illustrations of the Huttonian Theory." Hutton contributed frequently to the "Transactions of the Royal Society of Edinburgh" and also published several extended works, among the most important of which are *Dissertations on Different Subjects in Natural Philosophy* (1792), *Investigation of the Principles of Knowledge* (1794); *A Dissertation upon the Philosophy of Heat, Light, and Fire* (1794).

HUTTON, LAURENCE (1843-1904). An American essayist and critic, born in New York City and educated privately there. He was an inveterate traveler and for 20 years spent his summers abroad. From about 1870 he contributed continually, as dramatic critic and miscellanist, to periodicals, from 1872 to 1874 he was dramatic editor of the New York *Evening Mail*, and from 1886 to 1898 he was the literary editor of *Harper's Magazine*. He was one of the organizers of the Authors Club and of the International Copyright League. An ardent collector of literary curiosities, his collections were of remarkable interest. In 1892 he received the degree of A.M. from Yale and in 1897 from Princeton. His writings on dramatic subjects include *Plays and Players* (1875); *Curiosities of the American Stage* (1887), *Memoir of Edwin Booth* (1893), and, with Brander Matthews, *Actors and Actresses of Great Britain and of the United States* (1886-87). He edited the *American Actor Series* (1881-82) and published a group of delightful literary guidebooks, including *Literary Landmarks of London* (1887), *Edinburgh* (1892), *Jerusalem* (1895), *Venice* (1896), *Florence* (1897), *Rome* (1897), and *Literary Landmarks of the Scottish Universities* (1904). Consult M. E. Wood (comp.), *Laurence and Eleanor Hutton Their Books of Association* (New York, 1905), and J. Moore, *Talks in a Library with Laurence Hutton* (ib., 1905).

HUTTON, MAURICE (1856-). A Canadian educator. He was born in Manchester, England, and was educated at Magdalen and Worcester colleges, Oxford, graduating with high honors in classics. In 1880 he was appointed lecturer on classics and ancient history at Firth College, Sheffield. He went to Ontario

in the same year and was appointed professor of classics in University College, Toronto. In 1887 he became professor of Greek in, and in 1901 principal of, University College. In 1906-07 he was acting president of Toronto University. He was made a member of the Ontario Educational Advisory Council in 1906 and in 1913 was elected a fellow of the Royal Society of Canada, to whose *Transactions* he contributed.

HUTTON, RICHARD HOLT (1826-97). An English journalist and critic. He was the son of a Unitarian minister and was born June 22, 1826, in Leeds, Yorkshire. The family removed to London in 1835. Hutton was educated at University College School and subsequently at the college itself, with a view to the Unitarian ministry. After two semesters in Germany he returned to London and, finding no adequate sphere in the ministry, he became principal of University Hall. Resigning on account of ill health, which necessitated a trip to the West Indies, he studied law. Under the influence of F. D. Maurice he entered the Church of England. In 1861 Meredith Townsend bought the *Spectator* and called in Hutton to aid him in conducting it. As editor of this paper for 25 years, Hutton exerted great influence. Liberal but not radical in tone, it became in his hands the organ of the very best contemporary thought. As a critic, Hutton came to speak with much authority. His best work is represented by *Essays, Theological and Literary* (1871), containing under the second division essays on Goethe, Wordsworth, Shelley, Byron, Browning, George Eliot, and Clough, and *Essays on Some Modern Guides of English Thought* (1887), treating of Carlyle, Newman, Matthew Arnold, George Eliot, and F. D. Maurice. Two posthumously published volumes of Hutton's are *Aspects of Religious and Scientific Thought* (selections from the *Spectator*, ed. by E. M. Roscoe, 1899) and *Brief Literary Criticisms* (ed. by E. M. Roscoe, 1906). He also wrote a life of Scott (1878) and edited the *Biographical Studies of W. Bagehot* (1881). Hutton died Sept. 9, 1897, at Crossdepe. Consult J. Hogben, *R. H. Hutton of the Spectator: A Monograph* (2d ed., Edinburgh, 1900).

HUXLEY, THOMAS HENRY (1825-95). An English naturalist and comparative anatomist. He was born at Ealing, now a suburb of London, May 4, 1825. He studied in the Medical School of Charing Cross Hospital, and in 1845 was graduated as M.B. and medalist at the University of London. In 1846 he was appointed assistant surgeon on the *Rattlesnake* of the royal navy, commanded by Capt. Owen Stanley, which was to survey the region of the Great Barrier Reef, east and north of Australia. Imbued with a passion for natural history, Huxley devoted himself to the study of the marine animals seen and collected during the four years of this survey service. His most important research, "On the Anatomy and the Affinity of the Medusa," was published during his absence and placed its author in the front rank of biologists. He demonstrated that the body of the medusa is essentially built up of an inner and an outer membrane, which he asserted were the homologues of the two primary germinal layers in the vertebrate embryo. (See EMBRYOLOGY.) This discovery stands at the basis of modern philosophical zoology and of a true conception of the affinity of animals.

In 1850, on his return to England, Huxley



THOMAS HENRY HUXLEY
FROM THE PORTRAIT BY A. LEGROS

began a hard struggle against adversity and discouragement. Disappointed in the hope that the Admiralty would provide for the publication of his notes and drawings, he published the more important in the *Philosophical Transactions* (1851) and in the same year was elected a fellow of the Royal Society, which in 1852 gave him its medal. In 1854 he succeeded Edward Forbes as professor of natural history and paleontology at the Royal School of Mines. This was in the line of direct advancement, for his great ability as an educator and administrator as well as in original research brought him to many posts of honor, such as, in 1855, the Fullerian professorship of comparative anatomy at the Royal Institution, in 1863, the Hunterian professorship at the Royal College of Surgeons, in 1868, the presidency of the Ethnological Society, in 1869, the presidency of the Geological Society, in 1870, the presidency of the British Association for the Advancement of Science and a seat on the first school board of London, in 1871, the secretaryship of the Royal Society, of which he became president in 1883, in 1872, the lord rectorship of Aberdeen University, in 1881, the professorship of biology in the Royal College of Science (an expansion of the earlier chair in the Royal School of Mines), in 1892, Privy Councillor. He served on no fewer than 10 royal commissions, of which the most important were that of Inquiry into the Sea Fisheries (1864-65) and that on Scientific Instruction and the Advancement of Science (1870-75).

Huxley's gifts of exposition were as remarkable as his powers of research. His scientific lectures, like his papers, were models of clearness as well as accuracy, and he was both cogent and eager in debate, and fascinating in popular address. In 1858 he delivered the Croonian lecture on the "Origin of the Vertebrate Skull," in which he disposed forever of the hypothesis that the skull is, homologically, an expanded section of the vertebral column. The very next year *The Origin of Species* was published. Convinced by its arguments, Huxley threw himself heart and soul into their support, adducing much telling corroboration from his own investigations. His series of lectures to London workmen in 1860 had this for their theme and did much to further the acceptance of the new doctrines. They were the basis of the powerful book *Man's Place in Nature* and were succeeded by many addresses, essays, and debates, influential in informing the public and overcoming both scientific objections and religious alarm. It may fairly be said that science as contained in the doctrines of organic evolution, and especially in the views of Darwin, is almost as much indebted to the lucid exposition and bold championship by Huxley as to the originators of the theories. Nevertheless Huxley accepted Darwin's hypothesis of natural selection with a qualification. He pointed out the lack of evidence that any group of animals has, by variation and selective breeding, given rise to another group in the least degree infertile with the first, but he believed this objection might disappear under prolonged observation and experiment. As to Lamarck's theory of use inheritance (qv), he declared, in 1890, his absolute disbelief, as the evidence then stood.

Huxley came to America in 1876 and delivered in New York three lectures on Evolution, taking as his texts the series of fossil horses

During that visit he delivered the opening address at Johns Hopkins University. Huxley's contributions to science were of the widest range and embraced every department of biology. His exposition of the relations of protoplasm as the physical basis of life is particularly masterful. He was not only a man of science, but a publicist. His services were always at command for the promotion of political, social, and moral reform—first and chiefly for the cause of national education. His devotion to labors thus entailed, added to professional toil, did much to undermine his health, which for some years towards the end of his life was very poor. He died at Eastbourne, June 29, 1895.

Professor Huxley bore an honorable part in creating the knowledge which will make the nineteenth century memorable and a great part of it was made permanent in a series of books, of which the following is a complete list: *Oceanic Hydrozoa* (1859), *Evidence as to Man's Place in Nature* (1863), *Elementary Physiology* (1866, 4th ed, 1885), *Lay Sermons, Addresses, and Reviews* (1870, 3d ed, 1887), *Anatomy of Vertebrated Animals* (1871), *Critiques and Addresses* (1873), *Elementary Biology*, with Dr H N Martin (1875, 2d ed, 1876, 3d ed, ed by G B Howes and D H Scott, 1877), *American Addresses* (1877), *Physiography* (1877), *Hume* (1878), *The Crayfish: An Introduction to the Study of Zoology* (1880), *Collected Essays* (9 vols, 1893-94). These contained some reprinted material as follows: *Method and Results, Darwiniana, Science and Education, Science and Hebrew Tradition; Science and Christian Tradition, Hume, Man's place in Nature, Discourses, Biological and Geological, Evolution and Ethics*, and other essays. Four volumes of Huxley's *Scientific Memoirs*, edited by Sir Michael Foster and Prof E Ray Lankester, were published between 1898 and 1902. An authorized collection of his minor writings appeared in eight duodecimo volumes (New York, 1897-1900).

His *Elements of Biology* became the model for a large number of laboratory manuals, and his *Crayfish* is a classic of the methods of the investigator and the instructor combined. Whatever his theme, the weight and honesty of his thought and the distinction of his style make his works part and parcel of the best books of his time.

Consult Leonard Huxley, *Life and Letters of Thomas Henry Huxley* (2 vols, London, 1900), which contains a complete list of his writings and of the honors awarded him, P C Mitchell, *Thomas Henry Huxley: A Sketch of His Life and Work* (ib, 1900), Edward Clodd, *Thomas Henry Huxley* (New York, 1902), J R A Davis, *Thomas H Huxley* (ib, 1907), John Fiske, "Reminiscences of Huxley," in *Essays, Historical and Literary*, vol 11 (ib, 1907), H F Osborn, *Huxley and Education* (ib, 1910), S P Cadman, "Huxley," in *Charles Darwin and Other English Thinkers* (Boston, 1911).

HUY, u'ê' A strongly fortified town of Belgium, in the Province of Liège, situated amid lofty rocks on both banks of the Meuse, 18 miles from Liège (Map: Belgium, D 4). Its summit-crowning citadel, dating from 1322, is partly excavated in the solid rock and commands the passage of the river. The church of Notre Dame, a graceful Gothic edifice, was

begun in 1311 and restored after having been partially destroyed by fire in the sixteenth century. Its many institutions include an atheneum, boys' and girls' school, an industrial school, a theological seminary, and a teachers' institute. The town, in a rich vine-growing district, contains distilleries and paper and cloth mills, and in the vicinity are nonworks, coal, zinc, and tin mines. Pop., 1900, 15,061, 1910, 14,545. In one of the suburbs of Huy was formerly situated the abbey of Neufmoustier, founded by Peter the Hermit, who was interred within it. Huy was taken repeatedly by the Dutch and French in the many wars which swept over this region, and was last captured by Marlborough and Coehoorn in 1703. It was occupied by the Germans during the European War of 1914. For further details, see WAR IN EUROPE.

HUYDECOPER, hor'de-kō'pā, BALTHASAR (1695-1778). A Dutch poet and critic, born at Amsterdam. One of his first books, *Proeve van taal- en dichtkunde op Vondel's Heerschepingen van Ovidius* (1730), or annotations to Vondel's translation of Ovid's *Metamorphoses*, is an important contribution to classical study. So is his edition of the chronicle of *Melis Stoke* (1772). He was the most notable of those who attempted to purify the Dutch language and to render it more flexible. His collected poems were published in 1788. As a dramatist, he was not so successful. Among his plays are a translation of Corneille's *Œdipe* (1720) and *Achilles* (1719), an original drama, for some time very popular. He also made a verse translation of the *Satires and Epistles* of Horace (1737).

HUYGENS, hū'gēnz, Dutch pron hor'gēns, CHRISTIAN (1629-95). A Dutch mathematician, physicist, and astronomer. He was born at The Hague, a son of Constantijn Huygens. He studied at Leyden and Breda, devoting himself at first to law and then pursuing the study of mathematics. At the invitation of Minister Solbert of France, he settled in Paris, being given rooms in the Royal Library and made a member of the Academy. After the revocation of the Edict of Nantes he returned to Holland, where he lived the rest of his life. His early work, *Theorematum de Quadratura Hyperbolis, Ellipsis, et Circuli, ex Dato Portionum Gravitatis Centro* (1651), is an example of the talent which lay at the foundation of all his scientific achievements. This was followed by his *De Circuli Magnitudinis Inventa* (Leyden, 1654), reprinted in Rudol. *Archimedes, Huygens, Lambert, Legendre* (Leipzig, 1892), the object of each work being to expose the fallacies of Gregoire de Saint-Vincent. He also worked on the doctrine of probabilities already founded by Pascal and Fermat and published *De Ratiocinatione in Ludo Aleæ* (1656). Huygens was the first to apply the pendulum to clocks and to use the device to determine the acceleration of gravity. A complete description of Huygens's apparatus is contained in his great work, *Horologium Oscillatorium, sive de Motu Pendulorum* (1673). He also developed and gave precision to the investigations of Galileo upon accelerated motion under the action of gravity, and there is no doubt that to his studies and discoveries his great successor, Newton, in preparing his magnificent development of the principle of accelerating force, was largely indebted. Newton was a student and admirer

of his works and assigns to him, along with Sir Christopher Wren and Wallis, the distinguished epithet of *hujus ætatis geometrarum facile principes*.

Huygens was the first to construct powerful telescopes and in 1655 discovered the ring of Saturn and the fourth satellite of that planet. In 1659 he published an account of these discoveries in a work entitled *Systema Saturnium*. In the end of this work is described an invention of great importance in astronomy, viz., the micrometer (qv), by which small angles between objects viewed by a telescope are accurately measured.

In 1660 Huygens visited England, where he was admitted a member of the Royal Society. Huygens was the originator of the wave theory of light, and his theory, now accepted, was first stated by him in 1678, in his *Traité de la lumiere* (first printed in 1690, modern German translation in *Ostwald's Klassiker No 20*, Leipzig). In this theory light is conceived to be a form of motion in the medium through which it passes. (See LIGHT.) Later (1690) he was able to explain both reflection and refraction by wave motion in the ether and was also able to account for double refraction. To Huygens is due the discovery of polarization—a phenomenon which could not then be explained by the undulatory theory and led Newton to adopt the emission theory. Huygens was in error, however, in believing that the vibrations were longitudinal rather than transverse. The undulatory theory, however, did not gain general acceptance until the nineteenth century, when the experiments of Young and Fresnel placed it on a firm basis.

A new edition of Huygens's collected works has been published by the Holland Academy of Sciences in 10 volumes (The Hague, 1888-1905). For his biography, consult P. Harting, *Christian Huygens in zijn Leven en Werken geschilderd* (Groningen, 1868), and Bosscha, *Christian Huygens*, German translation by Engelmann (Leipzig, 1895).

HUYGENS, CONSTANTIJN (1596-1687). One of the greatest writers in Dutch literary history. He was born at The Hague. His father was secretary to the State Council, and from childhood he was trained to diplomacy, and in every polite art. Intellect in him was joined to beauty and strength. He studied at Leyden, London, and Oxford, and became a warm friend of Dr. Donne. Returning to Holland in 1620, he was sent on a diplomatic mission to Venice and twice to London (1621-23), where he was knighted by James I (1622). Meantime he had published *Batava Tempe*, a versified series of local legends and scenes, and a volume of satires, *Costelick Mal*. Then followed (1625) a large volume of miscellaneous poems, *Ota, Ledige uren*. That year he was made private secretary to the stadholder and in 1630 member of the Privy Council, wherein he long used political power with vigor and wisdom. In 1634 he translated Donne's poems and on the death of his wife (1637) composed *Daghwerck*, a sort of didactic elegy suggesting the manner of Tennyson's *In Memoriam*. *Hofswijck*, a poem on moral life, appeared in 1654. A collected edition of his poems appeared as *Korenbloemen* in 1658, his solitary drama, *Tryntje Cornelis*, in 1659. Although Huygens was not the greatest of Dutch poets or of Dutch statesmen, he was, in the combination of his qualities, one of the

most dignified and brilliant figures of the days of Holland's greatness. As a poet, he had more feeling for form and mastery of language, more ease and facility, than any other in his language. His complete works appeared in three parts in Groningen (1802-93). Consult his two practical autobiographies *De Vita Propria* (Amsterdam, 1817) and *Cluysweck* (ib, 1841). A D Schinkel, *Bejdrage tot de kennis van het Karakter van Constantijn Huygens* ('s-Gravenhage, 1842), A J Dumesnil, *Histoire des plus célèbres amateurs étrangers* (Paris, 1860), Jorissen, *Constantijn Huygens* (Amsterdam, 1871).

HUYGENS'S PRINCIPLE See LIGHT

HUYSMANS, his'mans, CORNELIS (1648-1727) A Flemish landscape painter, born at Antwerp. He was a pupil of Gaspar de Wit in Antwerp and of Jacob van Artois in Brussels, and because he lived a large part of his life in Malines (Mechlin) old catalogues sometimes mistakenly call him Michiel. There are pictures by him in the Louvre, the Hermitage, Hampton Court, the London National Gallery. Van der Meulen, for whom he painted some backgrounds, among them that of "The Investment of Luxembourg" (Nantes), tried to persuade him to come to Paris, but Huysmans refused, because he did not know French. His coloration is even stronger than Poussin's, whom he most resembles, but whose tediousness he does not share. He composed several large sacred pieces, among them the "Christ on the Road to Emmaus," which for many years adorned the choir of Notre Dame of Malines.

HUYSMANS, u's'man', JORIS-KARL (1848-1907) A French novelist, born in Paris, of a Flemish family, some members of which had achieved distinction as painters at Antwerp in the seventeenth century. He began literary life as a disciple of the crassest realism, as one may see by the fact of his contribution to *Les Soirées de Médan*. His novels present every stage of an evolution from sensual materialism, through spiritualism and Satanism, to Christian mysticism, in which there is indeed a curious strain of the sensual and material still. *Marihe* (1876) is a study of sordid prostitution, coinciding significantly in date with Goncourt's *Fille Elisa* and Zola's *L'Assommoir*. In *Les sœurs Vataré* (1879) Huysmans shows himself still a dilettante of moral anguish, sordid wretchedness, and contemptible vice. *En ménage* (1881) is a cynical commendation of marriage, and *A vou-leau* (1882) is a tour de force in nauseating description. Then in *A rebours* (1884) Huysmans turns as it were in a fierce desperation from materialism to a frenzied spiritualism. "All that transfigures or transforms reality enchants him," he makes his hero say. After this there are some barren years save for the insignificant *En rade* (1887) and *Un dilemme* (1887). Then *Lébas* (1891) carries the psychic evolution a step further in the morbid treatment of astrology and Satanism. This recrudescence of the occult and reassertion of the extranatural suggests a fascinated contemplation of religious mysticism, and in *En route* (1895) we find Huysmans indeed "on the road" towards such Christianity as may be consistent with pessimism. From this point the progress is steady and the course plain. *La cathédrale* (1898) carries the reader to the door of a Benedictine retreat, and *L'Oblat* (1902) ushers him within. All this latter work is full

of "fingering spiritual muscles to see if they are growing", it is thoroughly morbid, but thoroughly characteristic, too, of a French generation weary of material progress and of all problems save those that defy solution. Yet, in spite of glaring errors of taste, in spite of a recondite vocabulary and of a studied absence of structural unity, these novels are perhaps the frankest and subtlest analyses of the progress of a pilgrim soul since Bunyan's Christian allegory. And they are essentially autobiographic, for Huysmans, like his hero, retreated for some time to a Trappist monastery and became an unprofessed member of the Benedictine community at Ligugé, 'too much a man of letters to be a monk, too much a monk to stay among men of letters,' as is said of Durtal in the conclusion of *En route*, which is to English readers the most attractive of all his works and 'one of the most characteristic novels of our quarter century.' He wrote *Les foules de Lourdes* (1906). Consult G Coquiot, *Le vrai J. K. Huysmans* (Paris, 1912).

HUYSUM, ho'sum, JAN VAN (1682-1749) A celebrated Dutch painter of flowers and fruits. He was born at Amsterdam, April 15, 1682, and acquired the rudiments of his art from his father, JUSTUS (1659-1716), a landscape painter of considerable talent. Jan at first devoted himself to landscapes, in the classic style, smooth and lifeless, and only later in life began to paint fruits and flowers, studying especially the works of De Heem and Abraham Mignon (qv). His work differed from that of his predecessors in that he preferred to paint upon a light background. He surpassed in mellowness, purity, and delicacy of coloring, and in the exquisite disposition of his lights and shadows. He was fond of introducing birds' nests with eggs, dewdrops, insects, butterflies, and like motifs, rendered with such realism as almost to produce an illusion. The tissue of his flowers and the soft down of his fruit are incomparable in delicacy. His works were very popular and commanded the highest prices. He died at Amsterdam, Feb 7, 1749. Huysum's masterpieces are in the chief German and Dutch galleries, especially those of Berlin and Amsterdam, also at St Petersburg and Vienna, the Louvre is the richest of all, having 10 pieces, and there are excellent examples in the English private collections.

HUZVARESH, hūsh-va'rēsh. See PAHLAVI LANGUAGE AND LITERATURE

HWANG-HAI, hwang'hi' See YELLOW SEA

HWANG-HO, hwang'ho' See HOANG-HO.

HWANG-HSING See HUANG-HSING.

HWANG-TI, hwang'tē' (Chin, Yellow Emperor, or Ruler). The third of the *Wu Ti* (or Five Sovereigns), who are reputed to have governed China in its legendary period, prior to 2356 B.C. Like Fu-hi (qv) and many more of the great leaders of Chinese primitive times, his birth was miraculous, and many wonderful things are attributed to him. As an infant, he was said to have had a full command of language. The year 2697 B.C. is given as the first of his reign, and as he ruled under the influence of the element earth, he became known as the Yellow Emperor—a circumstance which, if he ever lived, might point to the region now known as Shensi (qv) as the location of his realm. There the earth is yellow, the atmosphere is tinted with yellow, and trees, houses,

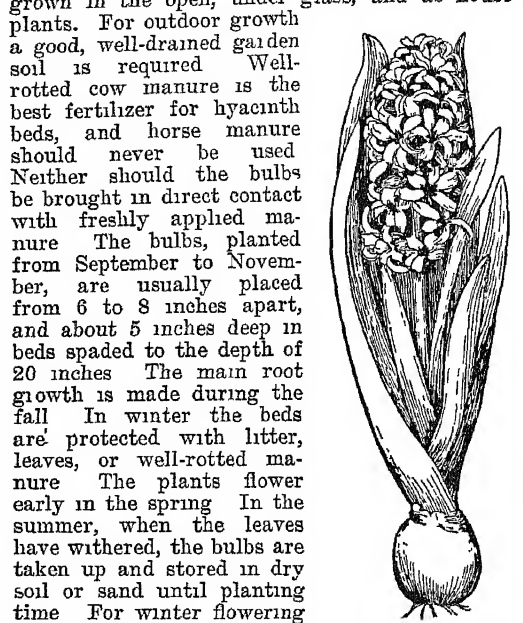
etc., are covered with the yellow dust from the mantle of loess (qv) which covers half the province. Yellow is still the favorite Chinese color. He extended his Empire east to the Sea of Shantung, west beyond the modern Province of Kansu, south to the Yang-tse-kiang. In the north he drove back the Hun-yu, the traditional foes of the Chinese. He is said by the Chinese to have regulated the calendar and to have introduced in the sixty-first year of his reign the sexagenary cycle by which successive days have ever since been designated, the application of the cycle of years dating only from the Han dynasty (which began in 206 B.C.). He is also credited with having introduced a decimal system, the arts of wood, pottery, and metals, boats and wheeled vehicles, and many other beneficent things. To Hwang-ti's wife is due the credit of having been the first to instruct the people in the rearing of silkworms. Hwang-ti was a virtuous ruler, and his reign was prosperous, though he ruled with an iron hand. He was merciless to rebels, but kind to his loyal subjects. He died at the age of 111 and was succeeded by his eldest son, Shau-hau (2597 B.C.). Consult the *Chinese Repository*, vol. xi (Canton, 1843), W. F. Meyers, *Chinese Reader's Manual* (Shanghai, 1874), De la Couperie, *The Western Origin of Chinese Civilization* (London, 1884); Dyer Ball, *Things Chinese* (New York, 1893), Friedrich Hirth, *The Ancient History of China* (ib., 1911).

HWEI-SANG, hwā'sang' (c. 420-c. 505). A Buddhist monk, who traveled to the land Fusang, which has been identified by some with Mexico. In 499 Hwei-sang came to King Chow, the Imperial city of the dynasty of Tsi, and in 502 told the Emperor the story of his travels in Fusang, a country to the east, so called from a plant, the *fusang*. His story was taken down in writing, its principal point was that Fusang had been converted to Buddhism by monks from Cabul in 458. The identification of Fusang with Mexico was first made by De Guignes in 1761, in the *Mémoires de l'Académie des Inscriptions et Belles-Lettres*, vol. xxviii, and was laughed at. In later times (1862-63) Gustav d'Eichthal upheld the theory, and (1875) so did Charles G. Leland. (Consult his *Fusang, or the Discovery of America*.) But the strongest impetus given to this belief was by Vining, *An Inglorious Columbus* (1885), and by John Fryer (1901), in *Harper's Magazine* (vol. ciii, pp. 251 et seq.), and in *Harper's Encyclopædia of United States History*, "Hui Shen," which should be consulted. He finds traces of Buddhist art in the idols of the Aztecs; of lama in the Aztec *tlanas*, of Gautama, in Guatemala, Huatomo, Guatemala, of Sakhya in Oaxaca, Zacatecas, Sacalepec, Zacatlan, Sacapulas, and Taysacca; of a correspondence between Fusang from fusang, and Mexico from maguey (or agave), while he explains away all difficulties by mistakes in the report of Hwei-sang's story due to his imperfect knowledge of Chinese and by the changes wrought in Mexico by the invasions of the Spanish.

HWLFFORDD, hul'fôrth. See HAVERFORD-WEST.

HYACINTH, hi'a-sinth (from OF *hyacinthe*, from Lat *hyacinthus*, from Gk. *ῥάκινθος*, *hyakynthos*, hyacinth, of doubtful etymology, hardly connected with Lat. *juvenis*, Skt *yuvan*, Eng *young*), *Hyacinthus*. A genus of bulbous plants of the family Liliaceæ, with linear radical leaves

and many flowers on leafless scapes. The blossoms are either erect, spreading, or drooping, and arranged in loose or dense racemes. The genus comprises about 30 species, of which three are natives of southern and tropical Africa and the rest of Asia Minor, Syria, and Persia. The few cultivated species are native to the region east of the Mediterranean Sea, and among them *Hyacinthus orientalis*, which has become naturalized in southern Europe, is by far the most important. The numerous varieties have single and double flowers of many different colors. The hyacinth has long been in cultivation, and about the beginning of the eighteenth century it stood almost first in popularity among florists' flowers, and many new varieties were produced. Then, as now, Holland, owing to its favorable climatic and soil conditions, was the principal hyacinth-growing country. Hyacinths are grown in the open, under glass, and as house plants. For outdoor growth a good, well-drained garden soil is required. Well-rotted cow manure is the best fertilizer for hyacinth beds, and horse manure should never be used. Neither should the bulbs be brought in direct contact with freshly applied manure. The bulbs, planted from September to November, are usually placed from 6 to 8 inches apart, and about 5 inches deep in beds spaded to the depth of 20 inches. The main root growth is made during the fall. In winter the beds are protected with litter, leaves, or well-rotted manure. The plants flower early in the spring. In the summer, when the leaves have withered, the bulbs are taken up and stored in dry soil or sand until planting time. For winter flowering the bulbs are started in the dark, and later on the plants are brought to bloom in the forcing house. As house plants, they are grown in hyacinth glasses with water only. Roman hyacinths are a form of *Hyacinthus orientalis* which produce three or four small flower spikes instead of a single large one. Two other species, *Hyacinthus amethystinus*, or Spanish hyacinth, and *Hyacinthus ciliatus*, are also cultivated to a small extent. There are a number of other plants, commonly called hyacinths, which belong to other genera of Liliaceæ. Among these are the grape (or globe) hyacinth and the musk hyacinth of the genus *Muscari*, the *Hyacinthus candicans* of gardeners, which is *Galtonia candicans*, the wild (or wood) hyacinth of Great Britain (also called bluebell) is *Scilla festalis*. The water hyacinth (*Eichhornia speciosa*), which occurs in American tropical and sub-tropical streams, often constitutes a hindrance to navigation. It belongs to the family Pontederiaceæ. See Colored Plate of AQUATIC PLANTS.



DUTCH HYACINTH

The brownish or reddish transparent variety of zircon, especially that found in Ceylon, frequently used as a gem. The name is also applied to similarly colored transparent

minerals, chiefly to the hessonite variety of garnet. See GEMS, GARNET

HYACINTHE, *h'a'sint'*, PÈRE See LOYSON, CHARLES JEAN MARIE

HYACINTHEUS (Lat., from Gk *ῥάκυνθος*). In Greek mythology, according to the usual story, the son of the Spartan King Amyclas, who reigned at Amyclæ. He was beloved by Apollo, who, while teaching the boy to throw the discus, accidentally struck and killed him. Later writers said that Zephyrus, also a lover of Hyacinthus, in jealousy by his blast turned the discus from its course against Hyacinthus. His grave was shown at Amyclæ, and on the throne of the image of Apollo, which stood over the grave, was represented the reception of Hyacinthus and his sister Polybœa into Olympus. The Hyacinthia, celebrated in his honor for three days each spring, were among the greatest Laconian solemnities, and Amyclæ the most sacred place in Laconia. (See GREEK FESTIVALS, in the paragraph devoted to the festivals at Sparta.) From the blood of Hyacinthus sprang the hyacinth, with the lament *AI* (*Ai*, *Alas*) on each petal. This flower is almost certainly not our hyacinth, but a species of iris. Consult L. R. Farnell, *Cults of the Greek States*, vol. iv (Oxford, 1907), and J. G. Frazer, "Adonis, Attis, and Osiris," book II, chap. 7, in his *Golden Bough*, part iv (3d ed., London, 1914).

HYADES, *hi'a-dēz* (Lat. nom. pl., from Gk *ῥάδες*, the rainy ones). In Greek mythology, nymphs of Dodona (*qv*), associated with the fructifying effect of moisture. They were the nurses of the newborn Bacchus and were rewarded by Zeus by being placed among the stars near the head of the Bull. According to another account they were daughters of Atlas and *Æthra* or *Pleione*, and sisters of the *Pleiades*, and were changed into stars after their death from grief at the loss of their brother Hyas, who was killed by a snake. The rising of these stars in spring (April) and their setting in the autumn (November) were looked on by the Greeks and the Romans as signs of wet weather. The name was sometimes rendered by the Romans *Suculæ*, 'little pigs,' because they derived *ῥάς* from *ῥσ*, 'sow'—rightly, in the opinion of some modern scholars. Consult Homer, *Iliad*, edited with English notes and introduction by Walter Leaf, book xviii, 486 (2d ed., London, 1902).

HYÆNODON, *hi-ên'o-dôn* (Neo-Lat., from Gk *ῥαῖνα*, *hyaina*, hyena + *ὀδούς*, *odous*, tooth). An extinct doglike creodont mammal. Fossil skeletons have been found in the late Eocene and early Miocene terrestrial deposits of North America and Europe. It was the latest and most specialized member of the *Creodonta*. Its head is very elongate with a strong posterior crest, the lower jaw is long and slender, and the canine teeth of both jaws are prominent. The body was of slender build, the legs rather short, the feet semiplantigrade, each foot with five clawed toes.

HYALITE. A transparent, colorless variety of opal, occurring in rounded masses resembling drops of water.

HY'ATT, ALPHEUS (1838-1902). An American naturalist. He was born at Washington, D. C., and was educated at the Maryland Military Academy, at Yale College, and the Lawrence Scientific School, Cambridge, from which he graduated in 1862. He served as a volunteer

throughout the Civil War, rising to the rank of captain. He afterward renewed his studies, becoming curator of Essex Institute, Salem, Mass., in 1867. He was the principal founder of the American Society of Naturalists and its president in 1883-84, organized a seaside laboratory at Annisquam, Mass., took part in the organization of the Marine Biological Laboratory at Woods Hole, Mass., and assisted in the founding of the Peabody Academy of Sciences, and became its curator in 1869. He was also one of the founders of the *American Naturalist*. In 1870 he became custodian, and in 1881 curator, of the Boston Society of Natural History, and in 1881 was appointed professor of zoology and paleontology at Massachusetts Institute of Technology and at Boston University.

He was elected a member of the National Academy of Sciences in 1875, was a corresponding member of the Geological Society of London, in 1898 received the degree of LL.D. from Brown University, and was a vice president of the American Academy of Arts and Sciences, Boston. His work as a paleontologist was masterly, besides making many innovations in the classification of the nautiloids and ammonites (*qv*), the final results form the most valuable contribution to the philosophy of biology. He was the founder of the new school of invertebrate paleontology. In systematic zoology he will be remembered for being next to the first one to refer the sponges to a distinct phylum. He also proposed many new genera, families, and numerous suborders of fossil cephalopods. He discovered the law of acceleration in the evolution of Cephalopoda and the mechanical causes of their evolution, of his work on the fossil pond snails of Steinheim and the origin of their various forms, Sir R. Owen wrote that it was "a model of the way and aim in and by which such researches should be conducted."

Hyatt wrote, besides many shorter articles *Observations on Freshwater Polyzoa* (1866), *Revision of North American Porifera* (1875-77), "The Genesis of the Tertiary Species of Planorbis at Steinheim," in *Memoirs of the Boston Society of Natural History* (1880), *Genera of Fossil Cephalopods* (1883), *Laical Theory of the Origin of Cellular Tissue* (1884), *The Genesis of the Arctida* (1889). He has edited *Guides to Science Teaching* and revised the part of the *Zittel-Eastman Text-Book of Paleontology* on Nautiloids and Ammonoids. These works make him prominent among the new school of American zoologists, led by Cope and Packard, which called itself Neo-Lamarckian. Professor Hyatt died at Cambridge in 1902. Consult A. S. Packard, "Alpheus Hyatt," in *Proceedings of the American Academy of Arts and Sciences*, vol. xxxviii (Boston, 1903), W. K. Brooks, "Biographical Memoir of Alpheus Hyatt," in *Biographical Memoirs of the National Academy of Sciences*, vol. vi (Washington, 1909).

HYATT, ANNA VAUGHN (1876-). An American sculptor, born at Cambridge, Mass. She studied at the Art Students' League in New York City and was a pupil of H. H. Kitson, H. A. McNeil, and Gutzon Borglum. Her work, shown at the exhibitions of the Society of American Artists and of the Philadelphia Academy and at the Buffalo Exposition (1901) and the St. Louis Exposition (1904), consists largely of small bronzes of animals. Notable examples are in the Metropolitan Museum of Art, New York. Among larger sculptures by

her are a fox, at Lancaster, N. H., and a colossal lion (1908), at Dayton, Ohio. Miss Hyatt's plaster cast of a life-size equestrian statue of Jeanne d'Arc won an honorable mention at the Paris Salon in 1910, and in 1914 the city of New York decided to place in one of its parks a bronze statue resembling the cast.

HYATT, JOHN WESLEY (1837-) An American inventor, born at Starkey, N. Y. His education was very meagre, and while yet in his teens Hyatt started upon his career as an inventor. His first important invention (1865) was that of a composition billiard ball which, by reason of the scarcity of ivory, became very popular. Four years later, by his discovery of a means of dissolving pyroxylin under pressure, he laid the foundations for the present immense celluloid industry. (See CELLULOID.) Undoubtedly Hyatt's greatest contribution to science, however, was the scheme he devised in 1881 for the purifying of large bodies of water. The success of his method has been attested by the general use made of it both in the United States and abroad. In 1900 he invented a lock-stitch sewing machine with 50 needles, for sewing belting, and later he patented a method of solidifying hard woods.

HYBLA (Lat., from Gk. Ὑβλη). The name of two towns in ancient Sicily, of uncertain sites. According to one view, Hybla Maior (or Hybla Megara) was situated on the seacoast, not far from Syracuse, and Hybla Minor (Hybla Geleatis) at the foot of Etna, on the site now occupied by the town of Paterno. Both were originally cities of the native inhabitants and were afterward Hellenized. From Hybla Maior came the Hyblæan honey, rendered so famous by the Roman poets. Consult Karl Baedeker, *Southern Italy and Sicily*, pp. 414, 432 (16th Eng. ed., Leipzig, 1912).

HYBODUS, hib'o-dūs (Neo-Lat., from Gk. ὕβος, *hybos*, hump + ὀδός, *odous*, tooth). An extinct genus of cestracant sharks found fossil in the Triassic and Jurassic rocks. Finely preserved skeletons of this shark have been found in the Liassic deposits of England. These fish had blunt heads, jaws armed with 9 to 10 rows of sharp, conical teeth, fins armed with long, sharp, anterior spines, and the skin was covered with shagreen, consisting of small pointed plates. Two sharp curved spines on each side of the head behind the eyes were present on the males only and perhaps served as offensive organs. The species varied from 3 to 6 feet in length. See SHARK.

HYBRID (from Lat. *hybrida*, *híbrida*, *íbrida*, hybrid), in plants. The progeny of parents which belong to different species or races. See HYBRIDITY.

HYBRIDITY. The phenomenon of the sexual crossing of two individuals belonging to distinct species. A hybrid is the product of this crossing and is contrasted with a mongrel, or the product of individuals belonging to distinct races or subspecies of the same species. The importance of hybridity is threefold.

1. *A Test of Species*.—Hybridity has been used by Cuvier and others as a test of species, as contrasted with varieties. It has been asserted that hybrids are sterile, whereas mongrels are fertile. So long as infertility of descendants is used as a criterion of species, this tenet is unassailable, the difficulty arises from the fact that the strict application of the criterion leads us to deny specific distinctions

to animals that are commonly regarded as such—e.g., the dog and wolf, dog and jackal, the hare and rabbit, various species of Bovidae (or oxen), sheep and goat, and, among plants, various forms of rhododendron, gladiolus, dianthus, meotiana, etc. Focke says concerning plants: "Many hybrids, especially those between unlike lines of descent, are infertile, most show a diminished fertility, some a *nearly normal fertility*." It may be concluded, therefore, that the Cuvierian definition of species will not hold. While fertile hybrids are thus not common, the capacity for hybridization in the first generation is widespread.

The question arises, Why are hybrids so often sterile? Various hypotheses have been proposed, but none can be said to be proved. Darwin's hypothesis is thus summarized: "The sterility of first crosses and of their hybrid progeny has not been acquired through natural selection. In the case of first crosses it seems to depend on several circumstances, in some instances on the early death of the embryo. In the case of hybrids it apparently depends on their whole organization having been disturbed by being compounded from two distinct forms, the sterility being closely allied to that which so frequently affects pure species when exposed to new and unnatural conditions of life. He who will explain these latter cases will be able to explain the sterility of hybrids." Wallace has a somewhat different view. A new species arises in connection with some slightly varying conditions of environment. If these are sufficient to create a change in coloration or form, they will, by virtue of correlation, affect also the germ cells and may give rise to a certain amount of infertility. Now, the infertility will be beneficial whenever new species arise in the same area with the parent form, because it would result in a preservation of both of the adapted forms. Consequently, whenever two species which are at the same time adapted and infertile arise, they will retain their respective adapted conditions and will survive. Finally, Catchpool and Romanes have independently suggested an explanation that is worthy of consideration—it is that the sterility of species is not something acquired, but is primary. Whenever from any cause two lots of individuals of one species become partly infertile inter se, those lots are, as it were, segregated. Each of them can develop its own way and give rise to a distinct species. If the species were not thus sterile at the beginning, differentiation would be difficult.

2. *Relation to Inheritance*.—Hybridity is important for the study of the laws of inheritance. Since the parents are more unlike, the nature of their combinations is still more interesting than in the case of ordinary sexual reproduction. Hybrids are particularly apt to show a reversion to an ancestral condition, especially when opposing characters are intermingled. The following rules concerning hybrids have been formulated by Focke: (a) "All the individuals formed by the crossing of two pure species or races are, if they have been produced and grown under the same conditions, exactly like each other, as a rule, or they differ hardly more than specimens of one and the same species are apt to do." This proposition is subject to many exceptions. In certain crosses the female element is predominant in the progeny, in others the male. Especially in cases of alternative

heritage (see HEREDITY) the hybrids may be of two types—the one resembling more the one parent, the other type the other parent (b) “The characteristics of the two crosses may be different from those of the parent species. They differ most from both parent species in size and luxuriance as well as in fertility.” In the case of alternative heritage an interesting rule was worked out by Mendel. In each pair of opposed characters one is dominant (“d”), one recessive (“r”). The first generation of hybrids show only *d* characters. If these breed together, 25 per cent of the offspring show *r* characters, and these are pure *r*, 75 per cent show *d* characters, but only one-third of these are pure *d*, the others being hybrid. These latter, when inbred, break up in the same proportion as before. The consequence of Mendel’s “law of dichotomy” in hybrids is that the proportion of the pure races is constantly increasing in the successive generations descended from a hybrid. “Malformations and curious forms are much more common, especially in the flower parts of hybrids, than in individuals of a pure descent.” Double flowers appear to be formed especially easily in hybrids. Hybrids are frequently infertile, because the pollen is imperfectly formed.

3 *Utility*—Hybridity has great practical utility in agriculture. Many varieties of our domesticated plants have arisen from artificial hybrids. The first generation of hybrids usually gives few results, but great variations continue to appear in subsequent generations. Thus, when two species of hybrid foliaceous plants are crossed, the leaves of the second or third generation are often highly variable. This great variability, on the other hand, renders any favorable variation liable to be lost unless great pains are taken to fix the desired quality by in-and-in breeding, or unless the quality can be reproduced vegetatively, i.e., by cuttings and grafts. The diminished fertility of some hybrids is agriculturally advantageous in the case of plants that can be reproduced vegetatively. Some of the advantageous results of hybridization are as follows (a) Increased Size and Vigor. The hybrid between the English walnut and the California black walnut is of exceptional value, ‘for it grows twice as fast as the combined growth of both parents. The wood is very compact, with lustrous silky grain,’ etc. Another hybrid of the black walnut and the California black walnut produces fruit of much larger size than that of either parent. These are illustrations of a common result of hybridization—increased size and vigor. (b) Increased Hardiness. The production of hardy races of plants is very important, because it carries farther north the limits of agriculture and increases the area of cultivation. Every few years the orange and lemon trees of the Gulf States and California are greatly damaged by freezing weather. The Japanese trifoliate orange is hardy, but has fruit of small size. It is hoped that a hybrid may be obtained between it and the ordinary orange which shall have increased hardiness without loss of size or flavor in the fruit. (c) Adaptation to Warmer Climate. The Kieffer and LeConte pears, which have revolutionized pear agriculture by extending the range of profitable pear growing hundreds of miles southward, are said to be hybrids between the common pear and the Chinese sand pear. (d) Increased Resistance to Disease. When the vast grape industry of France was

threatened with destruction on account of the ravages of the bug *Phylloxera*, immune American species were crossed with the French species, and immunity was gained by them. Similarly the black-rot disease in grapes has been fought by introducing the blood of immune races. (e) Increased Percentage of Starch, Sugar, etc. By hybridization the production per acre of the potato has been doubled, and the starch percentage increased from 15 to 26. While the percentage of sugar in the sugar beet has been hitherto chiefly increased by selection, there seems to be a chance for improvement by hybridization. A hybrid cinchona produces three to four times the ordinary percentage of quinine. (f) Change of Season and Duration of Life. By hybridization plants have arisen fruiting at unusual times, like Burbank’s blackberry and raspberry hybrids. A fairly successful attempt to make the pansy perennial resulted from crossing the garden pansy with the perennial *Viola cornuta*. (g) Acquisition of Odor. The fragrance of the pansy has been improved by crossing with odoriferous Alpine species. (h) Improvement of Quality and Flavor. This result is illustrated by the case of smoking tobaccos, in which the superior-flavored Havana race has been crossed with other races having larger leaves, so that a greater quality of well-flavored leaf has been produced. Altogether, many breeders conclude that by systematic hybridization most species of plants will be found capable of almost indefinite improvement.

In connection with the artificial production of hybrids the phenomenon of “xenia” has recently attracted much attention. This term is applied to cases in which characters of the pollinating parent appear directly in the fruit or seed. It was once thought that only the embryo could show hybrid characters, which would become evident, therefore, only upon the germination of the seed. In cases of xenia, however, the regions of the seed outside of the embryo show hybrid characters, so that it is evident that they too have been influenced by the pollinating parent. The crossing of the races of maize has proved to be most favorable for studying this phenomenon. If a race of maize normally producing white grains be pollinated by one producing red grains, the resulting grains will show the red coloration in various ways. The same result is also obtained in crossing races of sweet and dent corn. This phenomenon was inexplicable until the recent discovery of “double fertilization” among flowering plants. This phrase means that both of the male cells were brought by the pollen tube to the ovule function—one fertilizing the egg, which then produces the embryo, the other uniting with the “endosperm nucleus,” which then produces the endosperm or food substance of the seed about the embryo. It is evident, therefore, that where double fertilization occurs in connection with hybridizing the endosperm as well as the embryo is a hybrid, and that the resulting seed may show characters of the pollinating parent. See ANGIOSPERMS, FERTILIZATION, PLANT BREEDING.

Methods of Hybridizing. The methods of hybridizing plants are simple. If the flower is hermaphroditic, its stamens must be cut away before they are ripe—usually before the corolla opens—and the flower must be tied up in a paper bag. When the stigma is ripe, the pollen

is placed on it, and the bag tied over the flower again and not removed until the seed begins to form. If the flower bears no stamens, it requires, of course, no operation except the tying up while in the bud to prevent the access of foreign pollen. Among animals much less experimentation in producing hybrids for commercial purposes has been done.

HYBRIDITY IN ANIMALS

The number of animal hybrids known to have been produced or actually to exist is not large. The only special work on hybrids is that of Suchetot, the first volume (1001 pages) being devoted to birds alone.

Of hybrids produced by nature we have on record comparatively few examples, but the number is probably quite considerable. It is known that fish, especially the Salmonidae, readily hybridize. There are on record over 100 cases of hybrids among insects, and the number probably runs into the thousands. Of amphibians, species of diverse frogs have been seen mating, but it is not definitely known that such unions have given rise to hybrids. Natural hybrids among birds have been described, e.g., between the flicker of the eastern United States and the Mexican flicker, between two species of warblers of the genus *Helminthophila*, between species of geese, various European grouse, and certain Asiatic pheasants.

The hybridism which has taken place among the wild pheasants of the genus *Gemnaeus* in Burma is perhaps the most remarkable instance known. Three species—the black-breasted (*horsfieldi*), the lineated (*lineatus*), and the silver (*mythemus*) kallege pheasants—meet in this country, and from along the borders of their haunts a score of forms have been described and named as legitimate species, whereas they are merely hybrids, exceedingly variable even in the same brood and of interest only as examples of hybridism in nature.

Hybrids Produced Artificially. By artificial fertilization of the ova of different species, and even genera and families, of sea urchins, the early larval stages have been reared, but never carried to maturity, the resulting pluteus stages are more or less monstrous. In one case early larval hybrids between species of two different classes of echinoderms, starfish and sea urchins, were produced. The cases of fertile hybrids of birds and mammals mentioned below were produced in captivity, besides these there have been instances of hybrids between the brown and polar bear, the leopard and jaguar, the lion and tiger, the sea lion and fur seal, between the zebra and horse, the horse and ass, and the common ass and varieties of the kiang.

Hybrids are also known to occur between the dog and fox (Darwin), but this case is doubted by Ewart.

Variations of Hybrids. Darwin has shown that hybrids are more variable and have a greater tendency to vary than the products of pure race of both parents. He also has shown that the products of hybrids are much more variable than the hybrids themselves.

Results of Recent Experiments. Experiments by Standfuss on thousands of specimens of the higher Lepidoptera have shown:

1. The intercrossing of two species may result in anything, from complete sterility to the production of the normal number of fertile eggs.

These extremes may even occur as the result of crossing different individuals of the same two species. Hence a cross must not be pronounced infertile on the evidence of a single failure.

2. Individual differences in the structure of the genital apparatus may prevent effective crossing between some members of two given species, though other members of the same two species may pair freely.

3. Some crossings have resulted entirely in male, others entirely in female, offspring. A third class has given both sexes in various proportions.

As regards the fertility of hybrids, in no case observed by Standfuss or known to him has the female of a true hybrid been shown to be fertile. But the occurrence of undoubted cases of fertility in male hybrids has been proved by crossing the male hybrids with the females of both parent species, and in one case with the female of a third species.

The silk-moth hybrids of *Philosamia cynthia* and *Philosamia ricina*, the arrandy moth, two closely allied species, are also said to have been fertile for eight generations.

Fertility of the Hybrids. It is well known that the mule is infertile, and, though there are reported to be three cases where a mule has produced young, they are doubtful. Ewart, in referring to the instance of the Paris Jardin de l'Acclimatation mule, doubts whether these animals are mules, quoting Ayrault's opinion that the Paris mule was an ordinary mare. Darwin states that he knows of no thoroughly well-authenticated cases of perfectly fertile hybrid animals, though he adds "I have reason to believe that the hybrids from *Cervulus vagmalis* and *Reevesii* and from *Phasianus colchicus* with *Phasianus torquatus* are perfectly fertile." The hare and rabbit are supposed to have fertile offspring, the hybrids of the common and Chinese geese (*Cygnopsis cygnoides*) are fertile, as are hybrids between the common duck and the pintail duck. The crossed offspring from the Indian humped and common cattle interbreed. Caton has hybridized the Virginia deer with the Ceylon deer and the Acapulco deer and says that the hybrids seem perfectly healthy and prolific. The Indian dog and coyote are said by Coues to interbreed, and on the upper Missouri dogs have been seen having every appearance of being such hybrids. Hybrids of hares and rabbits have continued fruitful for generations, the same is true, says Hertwig, of hybrids obtained from the wild buck and the domesticated she-goat. The American bison is known to breed with the domestic cattle, and it seems to be a well-established fact that the hybrids are fertile. Ewart states that the Indian buffalo and the American bison produce fertile hybrids with the wild ox of Europe. Among fishes fertile hybrids have been obtained from the carp and goldfish and from the charr and the brook trout.

Relative Strength of Hereditary Influences. The three following conclusions rest on an elaborate series of experiments by Standfuss with three European species of Saturnia moths.

1. The freshly hatched hybrid larva closely resembles that of the female parent, but with the process of growth a resemblance to that of the male parent gradually increases.

2. The extent of approximation towards the male parent depends on the relative phylogenetic age of the two species—the older being able to

transmit its properties, whether of structure or habit, better than the younger

3 In reciprocal pairing the male is able to transmit the characters of the species in a higher degree than the female. This influence, however, is less regular and potent than that spoken of in the preceding paragraph.

The result of crossing a parent species with a local race, or with an aberration of the same species, is as follows

1 When the normal form of a species (*Grundart*) is crossed with a gradually formed local race of the same species, the result is a series of intermediate forms. 2 On the other hand, when the normal form is crossed with a sporadic aberration, the result in many cases is that the issue divides itself sharply between the normal form and the sport, intermediate forms being absent.

In commenting on these results, Dr F. A. Dixey remarks: 1 The experiments afford fresh illustrations of the manner in which the physiological isolation of an incipient species may be brought about. 2 They show that the statement of Focke as to the great variability of the offspring resulting from the crossing of a plant hybrid with one of the parent species holds good in the case of insects. 3 What Standfuss speaks of as the prepotency of the phylogenetically older of the parent species is probably only another expression of the principle established by Darwin that in many cases crossing causes reversion to a remote ancestor. 4. The general conclusion as to the prepotency of the male parent accords so far with one result of Galton's investigation of the late Sir E. Milnes's breed of basset hounds. 5 The result of crossing a parent species with a gradually formed local race, though less in degree, is much the same in kind as that of crossing two distinct species. 6 The result of crossing the normal form of a species with a sporadic aberration of the same species appears to show that the latter stand biologically on an entirely different footing from the regularly developed variety, even though it may indicate (as alleged by Eimer and by Jordan) the direction in which variation for that species is possible. With Standfuss's instances may be compared the well-known case of the otter sheep, which similarly, when crossed with a sheep of ordinary breed, gave no true intermediates. 7 Certain experiments with aberrations of this kind, of which exact numerical records have been kept for several generations, are of special interest in connection with Galton's law of heredity. See Galton, *Natural Inheritance*, p. 134 (London, 1889).

In still later experiments by Standfuss (1898) he shows that the crossing of two distinct species gives rise to a *Zwischenform*, but not to a *Mittelform*. The latter may, however, exist as a temporary stage in larval growth. This depends on the following principles: (1) the freshly hatched larva closely resembles the female parent, (2) with the process of growth a resemblance to the male parent gradually increases, (3) the final extent of approximation towards the male parent depends on the relative phylogenetic age of the two species, the older being able to transmit its properties, whether of structure or habit, better than the younger, (4) in reciprocal pairing the male is able to transmit the characters of the species in a higher degree than the female, (5) when the

normal form of a species (*Grundart*) is crossed with a gradually formed local race of the same species, the result is a series of intermediate forms, (6) when the normal form is crossed with a sporadic aberration, the result in many cases is that the issue divides itself sharply between the normal form and the sport, intermediate forms being absent.

Hence, according to Standfuss, adds Dixey, "the process of species formation must be gradual, for when two distinct species are crossed the issue does not split up into two parental forms, as in the case when one parent is a suddenly formed aberration. On the contrary, the behavior of the issue of two distinct species is very similar in kind to that of a species crossed with a local race or variety which is being gradually established by the accumulation of slight changes. It would seem, therefore, that although an aberration or sport may be perpetuated by inheritance, it can never acquire distinct specific rank. No doubt, however, it may, if selected, eventually replace the original form of the species."

Dixey also makes the interesting suggestion that these sporadic color aberrations "seem to have many points of resemblance with the color varieties in domestic animals, such as the 'lemon and white' and 'tricolor' of the basset hounds, or the well-known tortoise-shell, tabby, and black of cats. The fact that these domestic varieties exist side by side in the same race and even in the same litter, and that true intermediates are rare or absent, seems to suggest that they originally appeared as sports, and that their perpetuation has been insured or favored by artificial selection."

Zebra Hybrids In his *Penycaik Experiments* (1899) Ewart states that he bred nine zebra hybrids by crossing mares of various sizes and breeds with a Burchell zebra stallion, Matopo. The hybrids are interesting because of the curious blending of characters, derived apparently partly from their actual and partly from their remote ancestors, and because they shed new light on many questions of general interest, such as the origin of stripes, reversion, interbreeding, and prepotency.

Reversion. He concludes that "some of the hybrids in make and disposition strongly suggest their zebra sire, others their respective dams, but even the most zebra-like in form are utterly unlike their sire in their markings. It is not a matter of taking after a grandparent, but after an ancestor in all probability thousands of generations removed, an ancestor probably far more like the Somali than any of the Burchell zebras." (This confirms Standfuss's conclusion stated above.) Ewart adds (p. 21) "The reversion may be to recent, remote, or intermediate ancestors, and the tendency will in most cases be to revert to sports that here and there mark the route along which the development has proceeded."

He also, by breeding pigeons, restored the rock pigeon, or primitive form. "In the case of my most typical bird there is, as far as an external examination can show, practically complete reversion." Reversion, he says, "seems to lead to a form of rejuvenescence." He regards polydactylism in the horse as in part due to reversion to the Hipparion, or the three-toed fossil horse. As he well puts it, the cases of reversion that he cites "must be more or less accurate restorations of their comparatively re-

mote ancestors" Reversion also indicates that in some cases "varieties and breeds which have, through interbreeding, undergone senile degeneration, may be regenerated without the loss of their best and most prized characteristics"

Prepotency. It is generally assumed that an old species or variety is prepotent over a more recent species or variety. It is impossible to say whether zebra hybrids in their markings take after a remote zebra ancestor, or after an ancestor common to both zebras and horses, or after a hypothetical midparent combining the characters of the less remote ancestors of both zebras and horses. There is, however, no difficulty in seeing that while some zebra hybrids, apart from their stripes, closely resemble the zebra parent, others take after their horse parent, thus showing that the wild sire is not necessarily the most prepotent. "But even when the hybrids are distinctly horse-like they never repeat recently acquired peculiarities, such as a blaze, or short ears, high withers, or a small head and long neck"

Ewart believes that sports and certain marked variations are often prepotent, and also that inbreeding (see **POLLINATION**) is "common among wild animals, and that by inducing prepotency it plays an important part in the origin of species" It may be here observed that Ewart's experiments lead him to reject telegony (qv) and to explain such occurrences by cases of reversion. The zebra hybrids are also interesting as being "in some respects almost intermediate between their parents" Each parent, he says, hands on its most fixed individual characters. His zebra hybrids are neither new creations nor yet intermediate forms.

Sterility in Hybrids.—Ewart concludes that, as there is no hard and fast line between species and varieties, there can be "no fundamental difference between a hybrid and a cross, nor yet any a priori reason why any given hybrid should be sterile, or any given cross fertile. Sterility has doubtless been acquired in some cases slowly, in others abruptly, but how it has been acquired it is impossible in most cases even to guess"

Mendel's Law. Great interest has been excited among biologists by Mendel's law, and his discovery of certain principles of heredity which will prove of much practical value to breeders of plants and animals and lend a new phase to the theory of heredity and also of evolution, since the results thus far obtained point to discontinuing evolution and the absence of intermediate forms. Mendel's original paper was published at Brunn, Austria, in 1865, but was overlooked until De Vries in 1900 published an exact counterpart of Mendel's theory, while Correns and also Bateson hit upon the same law. As stated briefly by Spillman, it is as follows. In the second and later generations of a hybrid every possible combination of the parent character occurs, and each combination appears in a definite proportion of the individuals. A parent character which is fully developed in the hybrid is said to be "dominant", if it is apparently absent, it is said to be "recessive". A case in illustration is thus stated by Bateson. "In breeding crested canaries the kind of crest desired for exhibition can, according to canary fanciers, be produced most easily by mating crested birds with noncrested, or 'plain heads,' as they are called. If it be supposed that the crested character is usually dominant, we have

a simple explanation. When crested birds are bred together, a number of birds are produced whose crests are coarse and stand up, and others without crests. The latter are the recessives, the former we may suppose to be the pure dominants." The fact that the hornless breeds of goats will give off some horned offspring is probably due to the fact that they are what Bateson terms "heterozygotes," under what is usually called "reversion." From the analogy of cattle, it may be anticipated that the hornless form is dominant. Consult Bateson, *Mendel's Principles of Heredity*, with a translation of Mendel's original papers on hybridization (London, 1902).

Mendel's more important discoveries are also thus stated by Castle: "1 His law of dominance, when, for example, the offspring of two parents differing in respect of one character all resemble one parent and possess therefore the dominant character, that of the other parent being latent or recessive. 2 In place of simple dominance there may be manifest in the immediate hybrid offspring an intensification of character, or a condition intermediate between the two parents, or the offspring may have a peculiar character of their own (heterozygotes). 3 A segregation of characters united in the hybrid takes place in their offspring, so that a certain per cent of these offspring possess the dominant character alone, a certain per cent the recessive character alone, while a certain per cent are again hybrid in nature."

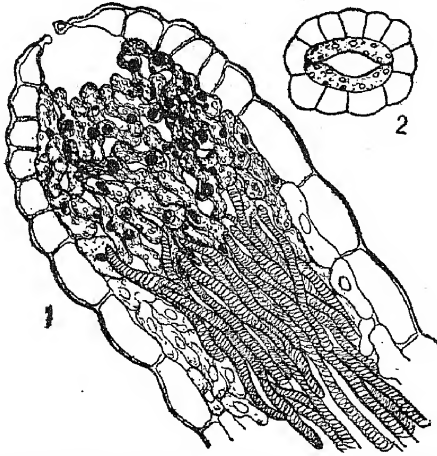
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HYBRIDIZING. See **PLANT BREEDING**, **GRAFT HYBRIDS**.

HYDASPES. The ancient name of the river Jhelam in northwest India. See **JHELAM**.

HYDATHODE, hŷdăth-ôd (from Gk *hŷdōp*, *hydōr*, water + *ôdās*, *hodos*, way). In botany, an organ that exudes water. Usually hydathodes occur at the tips of the main veins or branch veins of leaves and commonly appear to the unaided eye as leaf teeth. At the apex

of the organ is a pore which has been variously called water pore and water stoma. These pores differ from ordinary stomata in the absence of turgor movements, often in size and in their function; they are passageways for liquid



1, longitudinal section through leaf tooth of Chinese primrose (*Primula sinensis*), showing the divergent tracheids, terminating the vascular bundle, the loose epithem, and the terminal pore.

2, surface view of a water stoma (terminal pore of a leaf tooth).

water rather than for water vapor. Hydatodes commonly occur in connection with the vascular system and may be regarded as a sort of safety apparatus to prevent injection of the air space with water at times when root pressure is high and transpiration low.

HYDATID (Gk. *hḗdalis*, *hydatís*, water vesicle, hydatid, from *hḗdō*, *hydōr*, water; connected with OChurch Slav. *voda*, Skt. *udān*, water, and ultimately with Goth. *watō*, OHG. *wazzor*, Ger. *Wasser*, AS. *water*, Eng. *water*; AS. *wæt*, Eng. *wet*; OHG. *ottar*, Ger. *Otter*, AS. *otor*, Eng. *otter*). The bladder worm. It is allied to the tapeworm, but is smaller, containing only three or four proglottids, besides the head, and its "cysticercus" stage is large and bladder-like with numerous heads. These develop on secondary "daughter" cysts, attached to the wall of the cysticercus. About 5000 eggs are developed in a single segment (proglottis). The six-hooked embryos develop, are expelled from the dog, the first host, and find their way in drinking water or in food into the human intestines, whence they bore into the liver, their favorite habitat, or are carried along the blood vessels into some other organ, where they develop into bladder-like bodies, or "hydatids" (*Tania echinococcus*). By the fourth week the young is $\frac{1}{16}$ millimeter ($\frac{1}{16}$ inch) in length, and it is probably many months before the echinococcus heads are entirely developed. If transported to a dog, the worms become sexually mature in from seven to nine weeks, when the milk-white worms may usually be found embedded in the mucus of the duodenum and upper part of the small intestines, with their heads attached to the villous surface of the intestine. The parent vesicle may grow as large as a man's head. The cyst in which the bladder worm lies, and which is caused by it, is called a "hydatid cyst."

There are two forms of this hydatid—one

(*Tania hominis*) living in man, and the other (*Tania veterinorum*) in domestic animals. When these echinococcus cysts remain sterile, as they frequently do, they are called "acephalocysts." "Another, and indeed pathological form," says Sedgwick, "is the so-called 'multilocular' echinococcus, which was for a long time taken for a colloid cancer. It is also found in mammalia (in cattle), and here presents a confusing resemblance to a mass of tubercles. The echinococcus disease (*hydatid plague*) was widely spread in Iceland. This disease, likewise, seems endemic in many places in Australia."

HYDATID CYST. See **HYDATID**.

HYDE. A manufacturing town in Cheshire, England, on the river Tame, 7 miles east-southeast of Manchester (Map: England, D 3). Since the extension of the cotton trade it has rapidly increased in size. Besides numerous cotton factories, print and iron works, there are considerable manufactures of machinery, hats, and margarine. Coal abounds in the neighborhood. The district is densely peopled. Hyde has had its entire growth within the last century. It is mentioned as a village in the reign of King John; was incorporated as a municipal borough in 1881, with a mayor, 6 aldermen, and 18 councilors. It owns its water, markets, and cemetery, and maintains free baths, a library, hospital, and fire brigade. Its sewage is chemically treated for fertilizing purposes. Pop., 1901, 32,766; 1911, 33,444.

HYDE, ANNE, DUCHESS OF YORK (1637-71). The first wife of James II of England and the eldest daughter of the Duke of Clarendon. When she was 12 years old, she went to Holland with her mother and sisters and in 1654 was appointed maid of honor to the Princess of Orange at whose court she was a great favorite. It was while accompanying the Princess on a visit to Paris in 1656 that she first met James, then Duke of York. She became engaged to him about a year before his return to England in the spring of 1660 and, in spite of the most vehement opposition from all quarters, was privately married to him in September. Her father disapproved of the affair with great ostentation and afterward, with more sincerity perhaps, attributed his downfall to the match. At first the royal family would not recognize her, and fruitless attempts were made, by attacking her character, to influence the Prince to put her aside. She was an accomplished and attractive woman, though not handsome, and she maintained her position with regal dignity. She joined the Roman Catholic church soon after 1667 and converted her husband to that faith. Her daughters, however, were educated as Protestants. Anne and Mary, who became queens of England, were her only children that survived infancy.

HYDE, DOUGLAS (1860-). An Irish scholar and writer, born at Frenchpark, County Roscommon. He was educated at Trinity College, Dublin. In 1891 he was interim professor of modern languages in the State University of New Brunswick, and he was afterward made examiner in Celtic to the Royal University of Ireland. In 1906 he received the honorary degree of Litt.D. from the Royal University of Ireland, and in 1909 he was elected member of the senate and professor of modern Irish in the National University of Ireland.

Hyde early took up the study of Irish literature, and in particular the collection and publi-

cation of Gaelic songs and folk tales, and his labors in the preservation of native folklore constitute his most valuable services to Celtic scholarship. His *Literary History of Ireland* is the first attempt to write a comprehensive and systematic history of Gaelic literature. His translations of modern Gaelic lyrics are often particularly happy in rendering at once the simple feeling and the complicated metrical structure of the native poetry. He took a prominent part in the organization of the popular movement for the preservation of the Irish language and in 1906 visited the United States in its interests. He was made president of the Gaelic League (qv) at its foundation, in 1893, and also of the Irish Texts Society. In 1894-95 he was president of the Irish National Literary Society. He wrote *Leabhar Sgeulugh-eachta* (1889), *Cois na Teineadh, or, Beside the Fire* (1890-91), *Love Songs of Connaught* (1894), *The Three Sorrows of Story-Telling* (1895); *The Story of the Early Irish Literature* (1897), *An Sgeuluidhe Gaothlach* (3 parts, 1898-1901, Fr trans, 1901), *A Literary History of Ireland* (1899, 4th ed, New York, 1906), *The Lad of the Fenule, etc* (vol 1 of the publications of the Irish Texts Society, Dublin, 1899), *Ubhla de'n Chraoibh* (1900), a volume of poems, and *Sgeuluidhe Fíor na Seachtmháire* (1909). Part of his *Songs of Connaught* were contributed to the *Dublin Nation* (1906). In the same way his edition of the *Poems of Raftery* was published in the *Dublin Weekly Freeman* (1904).

HYDE, EDWARD. See CLARENDON, EDWARD HYDE, EARL OF

HYDE, EDWARD. See CORNBURY, EDWARD HYDE, LORD.

HYDE, EDWARD (c1650-1712). A Colonial Governor of North Carolina. He was appointed by the proprietors to be Governor of the Albemarle District in the Province of North Carolina, but on his arrival in August, 1710, found that the Governor of the province, from whom he was to receive his commission, had died, and that a former Deputy Governor, Thomas Carey, was leading an insurrection, a movement on the part of the dissenters against the establishment of the Church of England. A number of the more respectable residents requested Hyde to assume the office of Governor, which he did, and with the aid of Governor Spotswood of Virginia succeeded in putting down Carey's rebellion. Soon after, however, the North Carolina Indians, led by the Tuscaroras, went on the warpath and massacred many of the settlers. Hyde called on South Carolina and Virginia for aid, and on Jan 28, 1712, a body of South Carolina and North Carolina militia under Colonel Barnwell defeated the Indians on the Neuse River. The greater part of the tribe removed to New York and became the sixth nation of the Iroquois Confederacy.

HYDE, HELEN (?-). An American etcher and engraver. She was born at Lima, N Y, graduated from the Wellesley School, Philadelphia, and studied art at the San Francisco Art Institute under Emil Caislen, in Berlin under Frank Skarbina, in Paris under Raphael Collin, and in Tokyo under Kano Tomonobu. She is noted especially for her etchings in color and her woodcuts of women and children. She first attracted general attention by her etchings of the Chinese children of San Francisco, she then made a series

of woodcuts Mexican in subject, and she spent 14 years in Japan making etchings, water colors, and woodcuts of Japanese children and women. Complete series of her work are to be found in the Congressional Library, Washington, and examples are in the New York Public Library and the San Francisco Art Museum.

HYDE, HENRY BALDWIN (1834-99). An American life-insurance promoter, founder, and president of the Equitable Life Assurance Society. He was born in Catskill, N Y, and before he was 20 years old entered the employ of the Mutual Life Insurance Company of New York as clerk, becoming cashier in 1856. In 1859 he founded the Equitable Life Assurance Society in competition with the Mutual Life Insurance Company, and until his death he was its master spirit and dictator. His aim to make it the largest life insurance company in the world led to a fierce contest for business. He attempted to transmit his control to his son, James Hazen Hyde (qv).

HYDE, JAMES HAZEN (1876-). An American insurance official, son of Henry Baldwin Hyde. He was born in New York City and graduated from Harvard University in 1898. In 1899, upon his father's death, he became vice president of the Equitable Life Assurance Society of the United States. His disagreement with James W Alexander, the president of this company, led in 1905 to an investigation of the company's affairs, with the result that both factions retired. (See LIFE INSURANCE.) Hyde was chosen vice president and trustee of the Equitable Trust Company and a director in a large number of banks, railroads, and other corporations. After his break with the Equitable he removed to Paris, was made Officer of the Legion of Honor, and in 1913 married a daughter of John G A Leishman (qv), the widow of Count Louis de Gontaut-Biron.

HYDE, LAURENCE. See ROCHESTER, EARL OF

HYDE, THOMAS (1636-1703). A famous English Orientalist, born at Billingsley in Shropshire. Educated at Cambridge, he was an assistant to Walton in an edition of his *Polyglot Bible*. Besides correcting the Arabic, Syriac, and Persian texts, he transcribed in Persian characters the Persian translation of the Pentateuch which had been printed in Hebrew letters at Constantinople and appended a Latin version of his own. In 1658 Hyde entered Queen's College, Oxford, to which he was shortly after made Hebrew reader. In the following year, after graduating as M A, he was chosen underkeeper and finally librarian in chief of the Bodleian Library. In 1660 he was made a canon of Salisbury, in 1678, Archdeacon of Gloucester. He succeeded Pococke in 1691 as Laudian professor of Arabic and soon after, on the deprivation of Altham, became regius professor of Hebrew and canon of Christ Church. Hyde's most important work was the *Historia Religions Veterum Persarum eorumque Magorum* (1700, 2d ed, 1760). His other works were collected by G Sharpe, *Syntagma Dissertationum* (1767). They include a history of the game of chess, a translation into Malayan of the Gospel and the Acts, a treatise on the weights and measures of the Chinese, etc.

HYDE, WILLIAM DEWITT (1858-). An American college president, born at Winchendon, Mass. He graduated from Harvard University in 1879 and from Andover Theological Seminary in 1882. Ordained to the Congregational min-

istry in 1883, he was a pastor at Newark, N J, in 1883-85, and thereafter was president of Bowdoin College, also holding the chair of mental and moral philosophy. He is author of *Practical Ethics* (1892), *Social Theology* (1895), *Practical Idealism* (1897), *God's Education of Man* (1899), *The Art of Optimism* (1900), *The Cardinal Virtues* (1901), *Jesus' Way* (1902), *The New Ethics* (1903), *The College Man and the College Woman* (1906), *Abba, Father* (1908), *Self-Measurement* (1908), *Sin and its Forgiveness* (1909), *The Teacher's Philosophy in and out of School* (1910), *The Five Great Philosophies of Life* (1911), *The Quest of the Best* (1913).

HYDE DE NEUVILLE, J G, BARON See NEUVILLE, JEAN GUILLAUME, BARON HYDE DE

HYDE PARK An inclosure of 364 acres in London, England, about $2\frac{1}{4}$ miles west of St Paul's Cathedral (Map London, E 6). It derives its name from Hyde Manor, which belonged to the abbey of Westminster. It became the property of the crown on the dissolution of the monasteries, in the reign of Henry VIII. After this monarch it became famous as the scene of duels, deer hunts, and horse races. Charles II laid out drives and promenades which became fashionable and have ever since continued to be. It also serves as the place of large popular meetings. It has nine carriage entrances, and among its prominent features are the Serpentine (an artificial sheet of water constructed by order of Queen Caroline in 1730), Rotten Row, the Ladies' Mile, the Marble Arch, the Hyde Park Corner gateway, the statue of Lord Byron, and Westmacott's colossal statue of Achilles, erected in honor of the Duke of Wellington and cast from cannon captured at Waterloo.

HYDE PARK Formerly a town in Norfolk Co, Mass, annexed to Boston in 1912 (Map Boston and Vicinity, D 7). It has a public library and extensive manufactures of cotton, woolen, and rubber goods, paper, dyestuffs, looms, morocco, tools and machinery, cars, engines, motors, and curled hair.

HYDERABAD, or HAIDARABAD, hi'dā'-a-bad' A large native state of India, called also the Dominions of his Highness the Nizam. It occupies the central part of the Indian peninsula, being bounded on the north by Berar and northeast by the Central Provinces, on the southeast by Madras, and on the west by Bombay (Map India, C 5). Area, 82,698 square miles. The surface is an extensive plateau, with an average elevation of about 1250 feet, diversified by mountain, valley, and plain, and watered by the Godavari with its affluents the Dudna, the Manjra, and Pranhita, the Kistna with its affluents the Bhima and Tungabhadra, and the Wardha with its affluent the Penganga. The climate is fairly healthful, the annual precipitation registers 28 to 32 inches. The geological formation is a base of granite, gneiss, and talc slate, superimposed by clay, limestone, sandstone, hornblende, feldspar, and in some districts columnar basalt. Iron and coal are mined, and gold, garnet, and diamond beds, which formerly supplied the Golconda treasury, still exist, although modern mining operations for the precious minerals have hitherto been unremunerative. The soil is comparatively fertile, over 35 per cent of the area is under cultivation, and over 45 per cent of the population is supported by agriculture. Millet is the largest

agricultural product, others of importance are cotton, rice, sesamum, wheat, castor seed, grain, and linseed. Fruit culture, market gardening, pasturage of cattle and of sheep, and horse breeding are other agricultural branches. Bad seasons, notably in 1899-1900, have resulted in famine. There are domestic manufactures of silk, woolen, and cotton fabrics, carpets, and leather. Raw silk, cotton, hides, dyestuffs, gums, and resins are exported, and cereals, cloth goods, hardware, salt, and timber are imported. Good military roads traverse the state, and in 1901 there were 858 miles of railroad open. The ruler, the Nizam, is a Mohammedan, as are also the government officials, although the subjects are chiefly Hindus. There is a British Resident and adviser at Hyderabad, the capital. The annual revenue is over 45,000,000 rupees. The population in 1891 was 11,537,040, in 1901, 11,141,142 (the decrease being 3.4 per cent), in 1911, 13,374,676 (increase, 20 per cent), of the latter number, 6,797,118 were males and 6,577,558 were females. According to the 1911 census Hindus numbered 11,626,355, Mohammedans, 1,380,990, Animists, 285,722, Christians, 54,296 (of whom 18,473 Roman Catholics, 13,929 Anglicans, 8998 Baptists, and 8524 Methodists), Jains, 21,026, Sikhs, 4726, Parsis, 1529. Education made considerable progress during the latter part of the nineteenth century, but only a small proportion of the children attend school of the total population of 13,374,676 in 1911, 13,006,510 were illiterate. Literates numbered 368,166 (344,089 males, 24,077 females), literates in English, 26,526 (22,965 males, 3561 females).

Hyderabad, formerly attached to the dominions of the rajahs of Telangana and Vijayanagar, in 1512 became a separate kingdom, but in 1687 lapsed into a province of the Mogul Empire. In 1713 Asaf Jah, one of Aurangzeb's warriors, was appointed viceroy of the Deccan, with the title Nizam-ul-Mulk (regulator of the state), and eventually made himself independent. After his death, in 1748, the throne was contested by his son, Nazim Jang, supported by the English East India Company, and his grandson, Muzaffar Jang, whose cause was espoused by the French under Duplex. The latter triumphed until Muzaffar Jang was murdered by Patan chiefs. Anarchy reigned until Nizam Ali, who ascended the throne in 1761, was defeated by the British and signed the Treaty of 1766, which ceded the northern Circars to the East India Company. The misrule of Nizam Ali's successors increased the territorial debt, which was liquidated by a further cession of land to the East India Company, with the stipulation that part of the revenues should maintain the Nizam's contingent, a subsidiary force of 8000 men for the protection of his dominions. During the mutiny of 1857 an unsuccessful attack was made on the British Residency at Hyderabad, the Nizam and his troops, however, remained faithful to the British, and the state has since been distinguished for its loyalty to the Imperial power. Usman Ali Khan, the present Nizam, came to the throne in 1911. The most important work of his reign has been the construction of the Musi Reservoir at a cost of \$2,000,000. Consult A Gribble, *History of the Deccan* (London, 1896), and R P MacAuliffe, *Nizam, the Origin and Future of the Hyderabad State* (New York, 1904).

HYDERABAD, or HAIDARABAD. The

capital of the Nizam's Dominions, India. It stands on the right bank of the Musi River, in lat 17° 22' N and long 78° 27' E, 1800 feet above the sea (Map India, D 6). It is the fourth largest city in India, is an important railroad and commercial centre, and its well-stocked and extensive bazars are particularly picturesque. The splendid building of the British Residency stands on the opposite side of the river, the stream being here bridged by nine spacious arches of squared granite connecting the Residency with the Nizam's palace, three other bridges span the river. The city is surrounded by a fortified wall 6 miles in circuit. The most conspicuous building is the principal mosque, fashioned after the model of the Kaaba at Mecca and capable of accommodating 10,000 worshippers, while at the meeting of the four principal streets of the city rises another remarkable edifice, the Char Minar, or College with four minarets, 180 feet high, resting on connected arches, through which run the four converging thoroughfares. Water is supplied from huge tanks, one of which, close to the British cantonment of Secunderabad, measures 3 miles by 2; another is said to be 20 miles round. The city owns its water works and maintains schools, a hospital, and pleasure grounds with a zoological section. Pop. (including Secunderabad, Bolaram, and the Residency Bazars), 1891, 415,039. 1901, 448,466 (the increase being 81 per cent). 1911, 500,623 (116 per cent). In 1901 there were 243,241 Hindus, 189,152 Mohammedans, and 13,923 Christians. The city was founded in 1589 and was first named Bhagnagar. It fell into the hands of the Mughals in 1687 after the storming of Golconda, where it remained until 1724, when the first Nizam declared his independence and established the city as his capital.

HYDERABAD, or **HAIDERABAD**. The chief city of a district of the same name in the Sindh Division Bombay, British India, 4 miles east of the left bank of the Indus (Map India, A 4). The ancient capital of the Sindh Kingdom, its manufactures, including arms of various kinds, lacquered ware, gold and silver articles, and silks, have always been famous. There are three cotton gins. It is an important railway junction and commercial centre. The chief object of interest is the fort commanding the town. It covers an area of 36 acres. A modern section of the town has fine wide streets, public buildings, and a market place. There is a training college for men, one for women, an engineering school, a medical school, and an agricultural school. The cantonments containing model barracks are to the northwest of the town. Pop. 1901, 69,378, 1911, 75,952.

HYDER ALI, hī'der ā'le (more accurately, *Haider 'Ali*) (c 1720-82). Ruler of Mysore and one of the greatest Mohammedan princes of India. Of humble origin, he is said to have been originally a sepoy in the French army, which may explain the friendship which he always felt for the French. He won the favor of the minister of the Rajah of Mysore by the valor which he displayed at the siege of Trichinopoly in 1749 and, by a rapid rise not infrequent in the East, soon became the power behind the throne. Hyder Ali in 1759 dispossessed his master, allowing him, however, to retain his title, while he himself took that of *dawā*, or regent. He then conquered Calicut, Bednor,

Kananur, and other neighboring states, and in 1766 his dominions included more than 84,000 square miles. He waged two wars against the British—in the first of which (1767-69) he was completely successful, although deserted by his confederate Nizam Ali, a former friend of the English—and a treaty of peace was signed under the walls of Madras. According to the terms of this treaty, as he claimed, Hyder Ali asked the English in 1772 to help him against his old foes, the Mahrattas, who had already defeated him in 1764, but his request was refused. When a conflict broke out between the English and the French in 1778, he sought his revenge. With his son, Tipu Sahib, he entered the Carnatic in 1780 and proceeded to devastate it. After inflicting two severe defeats on the English, he was routed by Eyre Coote at Porto Novo. Two years later he died very suddenly. Consult *Le Maître de la Tour, Histoire d'Hyder-Ali Khan* (Paris, 1783). Husein Ali Khan Kirmani, *History of Hydr Arah* (trans by Miles, London, 1842). L B Bowring, *Haider Ali and Tipu Sultan* (Rulers of India Series, Oxford, 1893).

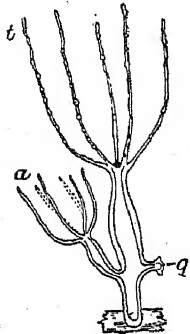
HYDNUM. A genus of fleshy fungi which gives name to the family Hydnaceae, or "tooth fungi." They are so named because the hymenium (qv) covers toothlike or spine-like processes rather than gill-like plates, as in the ordinary mushrooms.

HYDRA, hē'dra or ē'dra (Lat *Hydra*, Gk *Ἥδρα*). An island of Greece, situated 5 miles off the east coast of Morea (Map Greece, D 6). It is about 11 miles long and 3 miles broad and has an area of 22 square miles. The shores are rocky and steep, and the interior rises to a height of 1950 feet. On the north coast is the town and seaport of Hydra, the white, flat-roofed houses of which are ranged on the side of a hill. The streets are steep and uneven, but remarkably clean. It is the seat of a bishop, manufactures cotton and silk goods, leather, ships, and has a good trade. In ancient times the island of Hydra was a dependency of the city of Hermione and was later ceded to the Troezenians. During the fifteenth and sixteenth centuries it was settled by fugitives from Albania, Argolis, and Attica. In the Grecian War of Independence the Hydriotes took a most active part, and none were more liberal in their contributions to the patriotic cause. At the time of the outbreak of the Revolutionary War (1821-29) the islanders were considered the richest in the archipelago, holding the carrying trade of the Black Sea and shipping to England, the Baltic, and even to America. Since the Revolution, however, more accessible ports have risen to be the centres of Greek commerce, and Hydra has greatly declined. Pop. 1907, 5695, almost all concentrated in the town of Hydra.

HYDRA, hī'dra (Lat, from Gk *Ἥδρα*, water snake). A fabulous monster, offspring of Typhon and Echidna, dwelling on a hill near the spring Amymone in the marshes of Leina, near Argos. The hydra had many heads, of which the central one was immortal. The number of heads varies in the stories from 9 to 50, or even 100. In works of art she is shown with from 3 to 12 heads, except in Hellenistic times, when the hydra is often represented as a serpent with a woman's head. Hercules (qv) cut off the heads, while his companion, Iolaus, seared the stumps with a brand, as otherwise two

heads grew wherever one was cut off. The immortal head was buried beneath a huge rock. The hero dipped his arrows in the blood of the hydra and thereby made the wounds which they inflicted incurable. The hydra with its poisonous breath seems a personification of the malarial vapors arising from the swamps of Lerna, with their many springs.

HYDRA (Lat., from Gk. ὕδρα, water snake, Skt., Lith. *udra*, OChurch Slav. *vydra*, OHG. *otter*, Ger. *Otter*, Eng. *otter*, with Gk. ὕδωρ, *hydōr*, water). A minute polyp or hydrozoan, common in still, fresh waters. It possesses a gelatinous, subcylindrical body, which from its contractility undergoes various alterations of form. One end expands into a disk or foot, which adheres to a leaf or twig; while a mouth surrounded by a circlet of tentacles, varying from 5 to 12 or more in number, is at the opposite end. These tentacles are exceedingly contractile; at one moment they are thrown out as long, delicate threads, at the next, drawn up into minute wartlike knobs. Numerous nematocysts are in the surface layer of the body, each one of these containing a long, coiled, barbed thread which is quickly protruded if the animal is irritated. The mouth leads into a capacious cavity, excavated throughout the entire length of the animal, which, exclusive of its tentacles, seldom exceeds three-fourths of an inch. The food of the hydra consists of such minute living organisms as come within the reach of its tentacles, and by these apparently fragile threads, which the animal projects like a lasso, crustaceans, worms, and the like are seized, which would be deemed at first sight superior to their captor in strength and activity. The tentacles, however, exert through the action of the thread cells a powerful benumbing or paralyzing influence. The prey when mastered, but often when still alive, is thrust into the internal cavity, where the nutritive parts are absorbed by the hydra, while the indigestible parts are expelled through the mouth.



HYDRA VIRIDIS.

t, tentacles; a, a bud; a, young hydra, developed from a bud.

Although the hydra is usually found adhering to submerged supports, it is not permanently fixed. It often moves on surfaces under water somewhat after the manner of a leech, and occasionally the disk is protruded above the water and thus acts as a float. Sometimes, especially in the autumn, true reproductive organs may be observed, both male and female organs being usually situated on the same animal. Propagation by gemmation is, however, the most common mode of increase. Minute tubercles appear on the body of the parent animal, which, as they increase in size, gradually become perforated at their free extremity and acquire tentacles. The pedicel by which they originate by degrees becomes thinner and finally gives way, leaving the young hydra perfectly independent. One of the most remarkable points in the history of this animal is its power of being multiplied by mechanical division. If a hydra be cut into two or even more pieces, every one will in time assume the form and functions of the original

animal. Several species of hydra have been described, which differ in size, color, and other respects. Two species are common in America, in still water in nearly all parts of the country. One of these (*Hydra viridis*) is bright green in color, while the other (*Hydra fusca*) is grayish brown. The green hydra is notable because its color is due to the presence of chlorophyll, the coloring matter characteristic of plants. Both may easily be reared in aquariums.

HYDRAGOGUES (from Lat. *hydragogus*, Gk. ὕδραγωγός, water carrier, from ὕδωρ, *hydōr*, water + ἀγωγός, *agōgos*, carrying, from ἄγω, *agein*, to lead). Active purgatives which give rise to large, watery stools. The most important are colocynth, elaterium, gamboge, jalap, croton oil, and scammony. These are all powerful drugs, and their administration requires caution. They are used in general dropsy and serous inflammations.

HYDRANGEA, hī-drān'jé-ā (Neo-Lat., from Gk. ὕδωρ, *hydōr*, water + ἀγγεῖον, *angeion*, pail). A genus of about 25 species of ornamental deciduous shrubs of the family Saxifragaceæ, natives of North and South America, China, and Japan. The flowers are white, pink, or bluish, and small, but are borne in large, showy corymbs or panicles, the exterior flowers of which are sterile. The pink varieties, when grown on some soils, produce bluish flowers. The hardier cultivated hydrangeas are *Hydrangea paniculata*, used as specimens or in



HYDRANGEA.

borders, *Hydrangea arborescens*, and *Hydrangea radiata*. *Hydrangea hortensia otuska* is a rather dwarf variety, which is extensively grown in greenhouses, especially for the Easter trade. This variety is also frequently grown outdoors, but the plants should be lifted with a clump of earth before freezing weather and stored in a frost-proof pit or cellar until spring. Hydrangeas require a rather heavy, rich soil, well manured and well watered. They are propagated for the most part by cuttings and division, but sometimes by seed.

HYDRANT. See WATER WORKS.

HYDRARGYRUM, hī-drār'jī-rūm. See MERCURY.

HYDRARTHROSIS. See DROPSY.

HYDRAS'TINE. See ALKALOIDS.

HYDRAS'TININE. See ALKALOIDS.

HYDRAS'TIS (Neo-Lat., from Gk *ὕδωρ*, *hydōr*, water + *δρᾶν*, *dran*, to act) A genus of plants of the family Ranunculaceae, allied to Anemone, the members of which have flowers destitute of petals and succulent or baccate fruit collected into a head. The only known species, *Hydrastis canadensis*, a perennial herbaceous plant, with tuberous roots, and head of fruit resembling a raspberry, is common in rich moist woods in Canada and among the Alleghanies as far south as the Carolinas. Its root is used for dyeing yellow and also in medicine as a tonic. Yellowroot, orange-root, yellow puccoon, and goldenseal are its American names.

HYDRATE (from Gk *ὕδωρ*, *hydōr*, water) A name applied to substances whose molecules contain either one or more entire molecules of water or, synonymously with the term "hydroxide," to metallic compounds whose molecules contain one or more hydroxyl groups (OH). The question has been discussed, whether substances exist in aqueous solution in the form of 'hydrates' or not, i.e., whether the dissolved molecules are associated into definite groups with those of the solvent, and at the present time it seems almost certain that at least the ions of dissociated acids, bases, and salts are "hydrated" in aqueous solution. Some chemists are inclined to believe that the molecules of even a substance like common sugar are hydrated in solution. The subject is, however, still quite obscure. (See SOLUTION.) A substance containing water of crystallization is sometimes spoken of as a hydrate, and its crystals as hydrated crystals, particularly when they are to be distinguished from the anhydrous crystals of the same substance. On the other hand, chemists often use such terms as potassium hydrate and calcium hydrate in the same sense as they use the terms potassium hydroxide and calcium hydroxide. The hydrates, or hydroxides, of the metals are true chemical compounds. The assumption that substances are *chemically* combined with their water of crystallization, while corroborated by many facts, has not yet been brought into harmony with the doctrine of valency (q.v.), but this only indicates that the doctrine of valency needs modification and extension.

HYDRAULIC CEMENT. See CEMENT.

HYDRAULIC ELEVATORS. See ELEVATORS.

HYDRAULIC ENGINE. See HYDRAULIC PRESSURE ENGINE.

HYDRAULIC FORGING. See FORGE, FORGING.

HYDRAULIC JACK. See JACK.

HYDRAULIC MACHINERY. See ACCUMULATORS.

HYDRAULIC MINING. See GOLD.

HYDRAULIC PRESS (from Lat. *hydraulicus*, Gk *ὕδραυλικός*, *hydraulikos*, pertaining to the water organ, from *ὕδραυλις*, *hydraulis*, water organ, from *ὕδωρ*, *hydōr*, water + *αὔλος*, *aulos*, pipe) An apparatus for obtaining a heavy pressure for compacting fibrous substances, raising heavy weights, etc., by means of water under pressure. The first design of a working hydraulic press is credited to Joseph Bramah, and for this reason such machines are sometimes called Bramah presses. The operation of the hydraulic press is based upon the principle of hydrostatics that a pressure exerted on any part of the surface of a liquid is transmitted undiminished to all parts of the mass and in

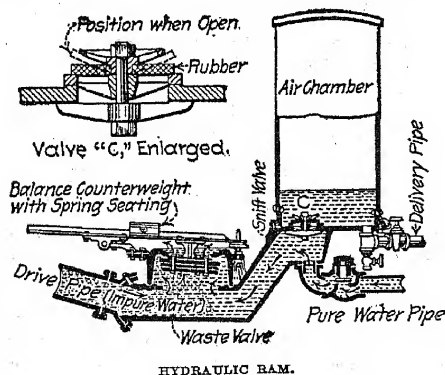
all directions. Thus, if there is a cylinder filled with water in one end of which works a plunger 1 inch square, and in the other end of which works a plunger 12 inches square, and a pressure of one pound be exerted on the smaller plunger, this pressure will be transmitted undiminished by the water, and will exert a total pressure of $1 \times 12 \times 12 = 144$ pounds.

The essentials of a hydraulic press are, therefore, a cylinder containing a small plunger, to which a force is applied, connected by pipe with a cylinder containing a large plunger, which transmits the multiplied pressure to the object to be pressed or lifted. It is evident, furthermore, that the two cylinders may be located any desired distance apart, the only limit being that at which the pipe and cylinder friction reduces the available pressure for performing work below practicable amounts. In modern practice the pressure pump commonly feeds into a hydraulic accumulator (see ACCUMULATOR), and the press cylinder is operated from the accumulator and not directly from the pump. The construction of hydraulic presses varies with the purposes for which they are employed. Hydraulic presses for baling hay and cotton and expressing the oil from seeds, etc., are built substantially as follows. Four iron pillars are erected at the corners of a horizontal square and carry a cast-iron cap rigidly fastened to their tops. The under face of this cap forms the surface against which the material is pressed. At the bottom of the four pillars there is a similar casting which has a circular hole in the centre down through which passes the cylinder casting for the plunger. The plunger has an upward motion in the act of pressing and carries on its top a head or platen consisting of a square casting. The material to be pressed is placed between the lower face of the top casting and the upper face of the platen. Often a boxing is placed around the four sides of the space in which the head moves to prevent the material being pressed from squeezing out laterally. The construction of a press for hydraulic forging differs from the above as follows. The cylinders and plungers are carried by the top casting or column cap, and the plungers work downward in the act of pressing, the bottom casting carries the anvil, the plungers carry a die for the head, and two or more cylinders are provided for raising the plunger and die for a fresh stroke. Generally, also, two pressure plungers and cylinders are employed instead of one. Forging presses are made of all sizes, from that required in pressing out articles like revolver cartridge cases to those used in forging steamship shafts and armor plates. Armor-plate presses having a capacity of 14,000 tons are in use.

HYDRAULIC-PRESSURE ENGINE. A motor in which water is made to do work by means of its pressure only, acting on a piston or plunger reciprocating in a cylinder, or, in some cases, on a revolving piston similar to those employed in a rotary steam engine. In the case of a turbine the pressure of a column of water is, in the first instance, employed in giving motion to the fluid itself, and after this motion has been produced the energy due to it is utilized in doing work. In the case of the pressure engine the only pressure expended in giving motion to the fluid is that needed to make the water follow the piston and escape from the motor, and to secure efficiency this piston should

be as small as practicable. This end is most nearly secured when the pressure is great and the speed of the engine is low. The first pressure engine was designed by Sir William Armstrong (q.v.) and was of the rotary type. This engine was never actually used and was replaced by a reciprocating engine designed by the same engineer. Since Sir William Armstrong's invention a great variety of hydraulic-pressure engines have been invented, the majority of which are of the reciprocating type. Hydraulic-pressure engines are particularly adapted to the use of high-pressure water in comparatively small quantities, and where these conditions prevail they have a considerable field of usefulness, particularly as secondary motors for operating mechanical contrivances, such as the opening machinery for swing bridges, cranes, hoists, etc. Consult: G. R. Bodmer, *Hydraulic Motors, Turbines, and Pressure Engines* (3d ed., New York, 1889); I. P. Church, *Hydraulic Motors with Related Subjects* (ib., 1905); Turneure and Black, *Hydraulic Engineering* (Chicago, 1908). See TURBINE; WATER POWER; WATER WHEEL.

HYDRAULIC RAM. Primarily a device by which the momentum of water flowing by gravity in a pipe is utilized to lift a portion of itself through another pipe to an elevation greater than the source of supply. The flow of water in the main or drive pipe is automatically checked by the closing of a valve at its foot. When the valve is open, the water escapes freely and flows to waste, but very soon a sufficient momentum is attained to close the valve. The confined water then lifts another valve, opening



HYDRAULIC RAM.

into an air chamber mounted over the foot of the drivepipe. The water partially fills this chamber and in so doing compresses the air therein until the pressure in the chamber just balances that of the column of water in the drivepipe. The valve at the foot of the drivepipe then opens, and the process is repeated. The pressure of the compressed air in the air chamber forces the water in the bottom of the chamber out through a small supply pipe to the desired elevation. A snifting valve is provided to supply air to the chambers to make good the losses due to absorption of air by the water. Theoretically 100 gallons of water falling 15 feet would raise 15 gallons 100 feet, and other quantities and heights in like proportion; but some water is wasted during each cycle, and there is more or less friction to be overcome, depending on the design of the ram and the length and diameter of the pipes. An efficiency of 75 per cent would

be high. With the increase in the ratio of the fall of the driving water to the elevation to be overcome, the efficiency decreases, particularly when the ratio exceeds 1 to 12 (i.e., 1 foot fall for 12 feet raised). Where the fall is great, the wear and tear on the ram is excessive. Some authorities give the desirable working limit for a hydraulic ram as $1\frac{1}{2}$ to 10 feet fall of drive water and a lift of not over 250 feet, but with so great a lift a large proportion of the water will be wasted. The ram, as described, was invented by Joseph Michael de Montgolfier, of France in 1796; but in 1772 an Englishman named John Whitehurst built a machine embodying the same principle, except that the valve at the foot of the drivepipe had to be closed by hand. His device was described in the *Philosophical Transactions* for 1775. Many improvements have been made in the machine of Montgolfier, the most important of which, perhaps, aim to lessen the shock of the operation of the valves. Springs have been used to that end; the drivepipe valve has been counterweighted, and a portion of the air compressed in the chamber has been used to drive a small air motor, so connected as to aid in the gentle closing of the valve at each cycle. Another improvement is the equipment of rams so that a supply of dirty water may be used to lift clean water, either when the supply of the latter is scanty or is not available under a sufficient head. Finally, hydraulic rams are used to drive pumps, when they are properly classed under pumping engines. See PUMPS and PUMPING MACHINERY.

HYDRAULICS. See HYDRODYNAMICS; HYDROSTATICS.

HYDRAZINE, or AMIDOGEN, $\text{H}_2\text{N}=\text{NH}_2$. A basic compound of nitrogen and hydrogen, which may be obtained by heating triazo-acetic acid with water. In 1909 Chattaway obtained it from dichloro-urea, which, in turn, may be readily prepared by the action of chlorine upon urea in aqueous solution at low temperatures. Hydrazine hydrate, $\text{N}_2\text{H}_4\text{H}_2\text{O}$, is a strong reducing agent precipitating metallic silver and platinum from solutions of their salts. Under a pressure of 740 millimeters it boils at 118.5°C . (245.3°F). It attacks rubber, cork, and even glass. With acids it forms crystalline salts, such as the hydrochlorides, $\text{N}_2\text{H}_4\text{HCl}$, and $\text{N}_2\text{H}_4\text{H}_2\text{SO}_4$, the sulphate, $\text{N}_2\text{H}_4\text{H}_2\text{SO}_4$, etc. The hydrogen of hydrazine may be partly replaced by either hydrocarbon groups, such as methyl (CH_3), ethyl (C_2H_5), phenyl (C_6H_5), etc., or organic acid radicals, such as acetyl (CH_3CO), benzoyl ($\text{C}_6\text{H}_5\text{CO}$), etc. The most important of these organic derivatives of hydrazine is phenylhydrazine, $\text{C}_6\text{H}_5\text{HN}=\text{NH}_2$. It is prepared by dissolving aniline in strong hydrochloric acid, adding (in the cold) an aqueous solution of sodium nitrite, then further adding a solution of stannous chloride in concentrated hydrochloric acid, allowing to stand for some time, and filtering off the solid phenylhydrazine hydrochloride formed; phenylhydrazine itself is freed from this salt by treatment with caustic potash, extraction with ether, and distillation under reduced pressure. The benzoyl compounds include benzoyl-hydrazine, $\text{C}_6\text{H}_5\text{CO}\cdot\text{HN}=\text{NH}_2$, and symmetrical dibenzoyl-hydrazine, $\text{C}_6\text{H}_5\text{CO}\cdot\text{HN}=\text{NCO}\cdot\text{C}_6\text{H}_5$. The presence of hydrazine in aqueous solutions may be readily detected by the use of a few drops of benzaldehyde, with which it forms a yellow crystalline precipitate of benzalazine, $\text{C}_6\text{H}_5\text{CH}\cdot\text{N}=\text{NH}_2$. Compounds of simi-

lar constitution are formed by the action of hydrazine on other aldehydes. In general the oxygen of the carbonyl group (CO) of an aldehyde or a ketone combines with two hydrogen atoms of many hydrazine derivatives, forming water, while the remaining parts of the reacting substances form what are known as *hydrazones*. For instance, ordinary glucose (an aldehyde) and phenylhydrazine give phenylhydrazone. See DIAZO COMPOUNDS.

HYDRAZONE See HYDRAZINE

HYDRIA, hī'di-a or hid'i-a See VASE

HYDRIDE A name applied, in chemistry, to the compounds of the metals with hydrogen. Notable hydrides are those of palladium, sodium, potassium, calcium, strontium, barium, and magnesium. The hydrides have, at least as yet, no practical value. The term "hydride" was formerly employed in connection with certain hydrocarbons. See HYDROGEN, CALCIUM, ETC.

HYDRIODIC ACID (from *hydro*-gen + *iod*-ine), HI. An acid compound of hydrogen and iodine, analogous to hydrochloric acid. It may be prepared by the action of phosphoric acid on potassium iodide. More usually it is made by the action of water upon a mixture of iodine and red phosphorus. A pure aqueous solution of hydriodic acid may best be prepared by dissolving a quantity of iodine in carbon disulphide, covering the solution with a layer of water, and introducing a stream of sulphureted hydrogen gas. When the iodine is entirely transformed into hydriodic acid, the aqueous layer is removed and boiled for a few minutes to remove the excess of sulphureted hydrogen. In the presence of catalytic agents, particularly platinum black, hydrogen and iodine unite into hydriodic acid gas directly, and at higher temperatures even the catalytic agent is not necessary, the union of the elements proceeding rapidly enough without it. However, whether a catalyzer is present or not, the union of hydrogen and iodine is never complete, a state of chemical equilibrium being established when a certain proportion of the elements has entered into combination. (See REACTION, CHEMICAL.) In its isolated state hydriodic acid is a colorless gas with an odor resembling that of hydrochloric acid. Usually it is kept in aqueous solution and is thus employed in a number of chemical processes. It decomposes somewhat easily into its components, hydrogen and iodine, and by giving up its hydrogen acts as a reducing agent. The salts of hydriodic acid are termed *iodides* (qv). Hydriodic acid is sometimes used medicinally instead of its salts.

HYDRIOTAPHTA, or **URN BURIAL**. A quasi-scientific, quasi-religious treatise by Sir Thomas Browne (1658). Its explanatory subtitle is *A Discourse of the Sepulchral Urns Lately Found in Norfolk*.

HYDROAEROPLANE, hī'drō-ā'ēi-ō-plān See AERONAUTICS

HYDROBROMIC ACID (from *hydro*-gen + *brom*-ine), HBr. An acid compound of hydrogen and bromine, analogous to hydrochloric acid. It may be prepared by the action of bromine upon red phosphorus placed in water, or by covering a mass of bromine with a layer of water and passing a stream of sulphur dioxide into the aqueous layer, when the bromine has disappeared, the aqueous solution is purified by distillation. In the practice of the organic laboratory hydrobromic acid is obtained as a

by-product in the bromination of aromatic hydrocarbons, e.g., in making bromobenzene by the action of bromine upon benzene in the presence of iron or some similar catalyzer. In the isolated state it is a colorless gas with an odor resembling that of hydrochloric acid. Like the latter, it is very soluble in water, the solution being sometimes used in synthetic chemistry. The salts of hydriobromic acid are termed *bromides* (qv).

HYDROCARBONS (from *hydro*-gen + *carbon*) A class of chemical compounds containing only carbon and hydrogen. Their commercial value is very considerable, inasmuch as they form the principal ingredients of petroleum, illuminating gas, caoutchouc, gutta serena, essence of turpentine, etc. They are the simplest of the compounds of carbon, and the fundamental ideas of organic chemistry have been derived largely from a careful study of their properties and reactions. They are obtained when various organic substances are subjected to a process of destructive distillation and are subdivided principally into *aliphatic*, or fatty, *aromatic*, and *hydroaromatic* hydrocarbons.

Fatty Hydrocarbons These form an important class and are subdivided into the paraffin, olefin, and acetylene series.

1 *The Paraffins*, or saturated hydrocarbons of the methane series, are very stable compounds and do not react even with the strongest acids and alkalis, hence their name, "paraffins," derived from the Latin *parum affinis*, which means 'having little affinity.' Large quantities of them occur in nature as petroleum, natural gas, ozokerite, etc. They are also obtained by the destructive distillation of coal, cannel, shale, etc. When they are arranged in the order of their molecular weights, the following "homologous series" is obtained:

Methane,	CH ₄ ,	molecular weight 16
Ethane,	C ₂ H ₆ ,	molecular weight 30
Propane,	C ₃ H ₈ ,	molecular weight 44
Butane,	C ₄ H ₁₀ ,	molecular weight 58
Pentane,	C ₅ H ₁₂ ,	molecular weight 72
Hexane,	C ₆ H ₁₄ ,	molecular weight 86
Heptane,	C ₇ H ₁₆ ,	molecular weight 100, etc

The difference in molecular weight between any two consecutive members of the series is evidently the same. It amounts to 14, the sum of the "weights" of one carbon atom (which is 12) and two hydrogen atoms (which is 2). To obtain the formula of any member, we may substitute a methyl group, CH₃, in place of a hydrogen atom in the member immediately preceding it. Thus, by substituting CH₃ in place of one H in ethane, C₂H₆, we get propane, C₃H₈, or C₂H₅CH₃. The transformation of ethane into propane may be actually effected as follows. First, mono-iodo-ethane (C₂H₅I) is obtained by substituting one iodine atom in lieu of one atom of hydrogen in ethane (C₂H₆), then mono-iodo-ethane is treated with methyl iodide (CH₃I) and metallic sodium. The iodine is thus all removed, and the remaining C₂H₅ group unites with the CH₃ group to form the compound propane (C₂H₅CH₃ or C₃H₈).

The first four members of the above homologous series are liquefiable gases, and each member is more easily liquefied than the one preceding it, the next 11 members are ordinarily liquids, each having a higher *boiling point* than the one preceding it. Finally, the higher members are ordinarily solids, each having a higher *melting point* than the one preceding it. The

lower members burn with a pale, scarcely luminous flame, the higher members give a bright light, and paraffin wax, which is a mixture of solid paraffin hydrocarbons, is used for the manufacture of candles. The paraffins are all colorless, chemically inert, and insoluble in water.

The composition of any single paraffin hydrocarbon is expressed, of course, by its own molecular formula. Thus, the formula C_2H_6 shows the chemical composition of ethane, the formula C_3H_8 shows the composition of propane, etc. On the other hand, the composition of the paraffin hydrocarbons in general is expressed by a *typical formula*, in which algebraic symbols stand for the numbers of atoms of the component elements. This typical (general) formula is C_nH_{2n+2} . The formula permits us to calculate the number of hydrogen atoms in any one of the members of the above homologous series, if the number of its carbon atoms is given. Thus, if $n = 1$, then $2n + 2 = 4$, and C_nH_{2n+2} becomes CH_4 (the formula of methane). The highest member of the series that is actually known to chemists contains 60 carbon atoms, and hence, the typical formula tells us, the number of hydrogen atoms in the molecule of that hydrocarbon (called *hexacontane*) is $2n + 2 = 2 \times 60 + 2 = 122$, and its molecular formula is therefore $C_{60}H_{122}$. It is a well-known fact that compounds exist which have the same chemical composition and yet differ in their physical and chemical properties. Such compounds are termed *isomeric*, and their mutual relations are explained on the assumption that the atoms in their molecules, though the same in kind and number, are differently *grouped*. In the above homologous series the first three members have no such isomers, i.e., only one variety of each could be obtained, the fourth member, butane, has two isomers (called butane and isobutane), the fifth member, pentane, has three isomers, the sixth, hexane, has five isomers, etc. The higher the molecular weight, the greater the number of isomeric formulas which could be constructed according to the structural theory. Not all of these theoretically possible hydrocarbons have been actually prepared in the laboratory. Most of them have no practical value and are interesting only inasmuch as they go to prove the validity of the "structural theory" of compounds, but the number of cases of isomerism in which the theory has been found to hold true is so great that chemists are no longer desirous of obtaining new proofs by artificially producing all of the possible isomeric compounds. See CARBON COMPOUNDS.

2 *The Olefins*, or hydrocarbons of the ethylene series, have the characteristic property of directly taking on bromine and other elements to form *additive* products. This shows that the combining capacity of the carbon contained in them is not completely satisfied by their hydrogen, so they are said to be "unsaturated compounds."

When arranged in order of their molecular weights, they form the following homologous series:

Ethylene,	C_2H_4 ,	molecular weight 28
Propylene,	C_3H_6 ,	molecular weight 42
Butylenes,	C_4H_8 ,	molecular weight 56
Amylenes,	C_5H_{10} ,	molecular weight 70
Hexylenes,	C_6H_{12} ,	molecular weight 84, etc

In this series, again, each member contains one carbon and two hydrogen atoms more than the member immediately preceding it, i.e., the dif-

ference in molecular weight between any two consecutive members of the series amounts to 14. Here, too, as in the paraffin series, a certain regularity is found in the variation of the physical properties of the compounds on passing up the series. The first four members are gases, and each one is more easily liquefied than the one preceding it. Hexylene and the following 13 members are liquids, each one boiling at a higher temperature than the one preceding it. The higher members are solids, and each one has a higher melting temperature than the one preceding it. The olefins are colorless and insoluble in water. They contain a high percentage of carbon and burn with a luminous flame.

The composition of *all* the olefins is expressed by the typical formula of the series, C_nH_{2n} . The ratio of the numbers of hydrogen and carbon atoms is the same throughout the series, showing that the different members of the series have all the same percentage composition. They are, however, not isomeric, in the ordinary sense of the term, for their molecules evidently contain different numbers of atoms. Thus, ethylene (C_2H_4) contains two carbons and four hydrogens, propylene (C_3H_6), three carbons and six hydrogens, etc. But, beginning with butylene, each single member represents several compounds which must be considered as isomeric, since they have precisely the same molecular composition and yet differ in their properties. The structural theory lets us foresee the existence of three isomeric butylenes, five amylenes, 13 hexylenes, etc. Again, as in the paraffin series, the higher the molecular weight, the greater the number of isomers possible, according to both theory and experience.

Hydrogen, particularly in the presence of a catalyzer, like platinum black, adds itself to the olefins (unsaturated), yielding hydrocarbons of the paraffin series (saturated).

Another interesting group of unsaturated hydrocarbons have come into prominence in recent years. The best-known examples of these are triphenylmethyl and triphenylmethyl. In these the atom of carbon is not quadrivalent, as usual, but *trivalent*. See VALENCY.

3 *The Acetylene Hydrocarbons*, when arranged in the order of their molecular weights, form the following homologous series:

Acetylene,	C_2H_2 ,	molecular weight 26
Allylene,	C_3H_4 ,	molecular weight 40
Crotonylene,	C_4H_6 ,	molecular weight 54, etc

Like any other homologous series, the acetylene series presents a certain amount of regularity in the variation of the physical properties of the compounds with increase of their molecular weight.

The acetylenes are unsaturated, in fact, they are *doubly* unsaturated compounds (see ACETYLENE), as is shown by their capacity for taking on bromine and other elements to form additive products. The acetylene hydrocarbons burn with a very smoky flame, unless by some method enough oxygen is supplied to burn up completely the large amount of carbon they contain. The general formula of the series is C_nH_{2n-2} . Nascent hydrogen adds itself to the acetylene hydrocarbons, yielding still unsaturated hydrocarbons of the ethylene series.

Aromatic Hydrocarbons. The principal groups into which these hydrocarbons are subdivided include the *Benzene series*, the *Naphthalene series*, and the *Anthracene series*. The

typical formulas representing these three series are, respectively, C_nH_{2n-6} , C_nH_{2n-12} , and C_nH_{2n-18} . Other hydrocarbons, not included in these series, are represented by the formulas C_nH_{2n-8} , C_nH_{2n-10} , C_nH_{2n-14} , C_nH_{2n-20} , etc., but these are not important enough to be discussed here. The most important members of the benzene series are benzene (C_6H_6), toluene (C_7H_8), and xylene (C_8H_{10}). The most important substance of the naphthalene series is naphthalene itself ($C_{10}H_8$), that of the anthracene series, anthracene ($C_{14}H_{10}$). All these are described in special articles. Suffice it to mention here that the chief source of aromatic hydrocarbons is the coal tar (qv) obtained as a by-product in the manufacture of coal gas, and that it is principally from these hydrocarbons that innumerable artificial dyes, drugs, etc., are now made on an industrial scale.

Hydroaromatic Hydrocarbons. These bear the same relation to the aromatic hydrocarbons as the paraffins bear to the olefins (see above), in other words, they may be considered as derived from the aromatic hydrocarbons by the addition of hydrogen. As a matter of fact, they are in most cases most readily prepared by treating the corresponding aromatic hydrocarbons with hydrogen gas in the presence of finely divided metallic nickel, a catalyzer introduced by Sabatier and Senderens. They are mobile, colorless liquids, volatile, and having an odor resembling that of printer's benzine on the one hand and that of camphor or peppermint oil on the other hand. They are much more stable than the aromatic hydrocarbons and are altogether similar to the fatty hydrocarbons in chemical behavior. Thus, strong nitric acid has no effect on them under conditions where an aromatic hydrocarbon would be readily nitrated. On the other hand, *dilute* nitric acid attacks them, according to Konovaloff, at the boiling temperature of water. One of the best-known members of the series is cyclohexane, or hexahydrobenzene, C_6H_{12} . The derivatives of the hydroaromatic hydrocarbons include such important substances as the terpenes (qv) and the camphors.

The hydrocarbons should not be confounded with the carbohydrates, like sugar, starch, or cellulose, which contain, besides carbon and hydrogen, also oxygen. See CARBON COMPOUNDS, GRIGNARD REACTION, VALENCY.

HYDROCELE (Lat., from Gk *ὕδρωκέλη*, *hydroskēlē*, from *ὕδωρ*, *hydōr*, water + *κέλη*, *kēlē*, tumor). The medical term for dropsy of the tunica vaginalis, a serous membrane or sac investing the testes. Hydrocele occurs as a smooth, pear-shaped swelling, fluctuating when pressed, devoid of pain or tenderness, but sometimes causing a slight uneasiness from its weight. The quantity of serous fluid in the sac is usually from 6 to 20 ounces, but it occasionally exceeds 100 ounces. Hydrocele may occur as a result of acute inflammation, but it most commonly comes on without any apparent local cause. It is most frequently met with about or beyond the middle period of life, and generally in persons of feeble power or with a tendency to gout, sometimes, however, it occurs in young children, either in the same form as in adults, or as what is termed *congenital hydrocele*, when the communication between the tunica vaginalis and the abdominal peritoneum is not obliterated, as it normally should be. Palliative treatment consists in the use of suspensory bandages,

strapping, and tapping with a fine trocar. Tapping seldom gives more than temporary relief, the swelling usually regaining its former bulk in three or four months. A cure is sometimes effected after tapping by the injecting of irritating substances, such as tincture of iodine and carbolic acid. The only certain method of cure, however, consists in excision of the tunica vaginalis.

HYDROCEPHALUS (Neo-Lat., from Gk *ὕδροκέφαλον*, *hydroskephalon*, water in the head, from *ὕδωρ*, *hydōr*, water + *κεφαλή*, *kephalē*, head). A collection of serous fluid in the cranium. If it is within the ventricles of the brain, the condition is known as *internal hydrocephalus*, if beneath the arachnoid membrane, *external hydrocephalus*. The disease may be *primary*, being then usually tuberculous in origin, or it may follow some other disease, in which case it is termed *secondary*. Three types—the *acute*, the *chronic*, and the *congenital*—are described. Hydrocephalus may occur in children or in adults as a secondary lesion resulting from meningitis. In such cases, the bones of the skull having united, there is much less opportunity for distention.

Acute Hydrocephalus. This is usually a sudden disease, marked by an acute collection of fluid within the skull, internal or external to the brain ventricles. It may be primary or secondary to such diseases as whooping cough, heart disease, rachitis, tumors within the skull cavity, or acute fevers, such as pneumonia or typhoid. The symptoms are various, much depending on its cause. The most characteristic symptoms are those due to the pressure on the brain. In addition to the enlargement of the head there may be much restlessness, inability to sleep, nausea and vomiting, paralysis or convulsions. The pupils are apt to be unequal and sluggish. In the severer cases pressure upon the brain causes death. See MENINGITIS.

Chronic Hydrocephalus. This may follow an acute attack, or the disease may begin very insidiously. The symptoms again are those due to pressure. The fontanels in the skull are apt to bulge, the eyeballs protrude somewhat, the blood vessels on the outside of the head are apt to be swollen and prominent. Headache is common. A peculiar sidewise shifting movement of the eye, termed nystagmus, is very constant, and crossed eyes are not uncommon. There is usually much restlessness, and if the patients live they are apt to be dull mentally or idiotic. Some of these patients live to middle age, but most of them die young. The treatment requires the greatest medical and surgical skill.

Congenital Hydrocephalus. The distention may be so slight at birth as to be scarcely evident, or the distention may be considerable or so advanced as to preclude the birth of a living child. After birth the progress of the disease may be gradual or rapid. The lateral ventricles usually show the greatest distention, although all the ventricles may be involved as well as the central canal of the cord. The condition of the brain tissue depends entirely upon the amount of pressure. It may be little different from normal, or the convolutions may be flattened, or the hemispheres may be reduced to a thin layer under the dura mater. The brain tissue itself is apt to be soft and flabby, and the base of the brain is usually less affected than the hemispheres. The openings between the bones of the skull are large in size, the bones thin and tend-

ing to bulge forward, making the forehead prominent

A few rare cases of spontaneous cure of hydrocephalus have been reported, following the accidental discharge of the cerebrospinal fluid. Surgical measures are occasionally successful in arresting or curing the affection. In young children having internal hydrocephalus a fine aspirating needle may be thrust through the coronal suture into one of the ventricles, and the cerebrospinal fluid evacuated. The latest surgical procedure is to trephine at the vertex of the skull and insert a specially devised trocar between the hemispheres of the brain, through the corpus callosum and so into the lateral ventricle. By this method a free communication is established between the internal and external cerebrospinal cavities, and pressure equalized.

HYDROCHARITACEÆ A family of aquatic monocotyledonous plants. It is known as the "frog's bit" family and includes not only the frog's bit (*Lumnobium*), but also "water weed" (*Elodea*) and "tape grass," or "eel grass" (*Vallisneria*, q.v.)

HYDROCHLORIC ACID (from *hydro*-gen + *chlor*-ine), or **MURIATIC ACID**, HCl. A gaseous compound of hydrogen and chlorine, the aqueous solution of which is extensively used in the arts. It was known to the alchemists, who refer to it as *spiritus salis*; Glauber isolated it in the form of a pure aqueous solution about the middle of the seventeenth century by treating common salt with sulphuric acid. Priestley obtained it in the gaseous state and called it *marine acid air*. Lavoisier introduced the view that all acids necessarily contain oxygen, and hence hydrochloric acid was for years believed to contain oxygen. About 1810 Davy had established the elementary nature of chlorine, and hence the true nature of its hydrogen compound—hydrochloric acid, and within 10 years the correctness of his results became generally recognized. (See **CHEMISTRY**.) Hydrochloric acid occurs in the exhalations from active volcanoes, especially from Vesuvius and the fumaroles of Hecla. It is also a constituent of the waters of certain South American rivers that have their source in the volcanic districts of the Andes. Also it is a constituent of the gastric juices of man and animals and plays an important part in the digestive process. When sodium chloride (common salt) is decomposed by heating with sulphuric acid, as in the Le Blanc process for making soda, sodium sulphate ("salt cake") remains behind, while gaseous hydrochloric acid is evolved. The acid was formerly allowed to pass off into the air, and naturally had an injurious effect on vegetation in the vicinity of the manufacturing establishments. At present the acid vapors are carefully collected, and hydrochloric acid constitutes an important by-product of the manufacture of soda.

Hydrochloric acid is a colorless gas with a pungent odor and taste, and fuming strongly in the air. It is extremely soluble in water. On the application of pressure and cold the gas can be condensed to a colorless liquid; but the commercial product is usually dissolved in water. It is the strongest acid known, and accordingly its aqueous solution is an excellent conductor of electricity. The commercial acid is generally colored by the presence of some iron, it also usually contains arsenic and sulphuric acid, from all of which impurities it may be freed by distillation. The acid is used

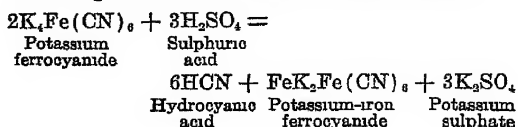
in preparing the chlorides of various metals, for extracting phosphates from bones, in dyeing and tissue printing, and in the manufacture of coal-tar colors. For works on hydrochloric acid, consult the various books on the manufacture of soda.

Chlorides. The salts of hydrochloric acid are termed chlorides. By far the most important of these is the chloride of sodium, or common salt, which is described in a special article. Very similar to it is the chloride of potassium, KCl, which occurs extensively (combined with magnesium chloride) in the mineral carnallite, at Stassfurt in Germany, and in smaller quantities in sea water. It is manufactured from carnallite and is purified by recrystallization from water. The chloride of aluminium, Al_2Cl_6 , is obtained by treating aluminium oxide with charcoal in a current of chlorine, or by passing a stream of chlorine gas over heated metallic aluminium. It is readily soluble in water, alcohol, and ether, but in aqueous solution it is hydrolyzed to a considerable extent, and the free hydrochloric acid in its solution may be driven off, leaving behind aluminium hydroxide. Aluminium chloride is largely used in organic chemistry in the so-called Friedel and Crafts reaction. See **FRIEDEL**. For other chlorides, see **BARIUM**, **CALOMEL**, **GOLD**, **MANGANESE**, **MERCURIC CHLORIDE**, **SAL AMMONIAC**. See also **BLEACHING POWDER**.

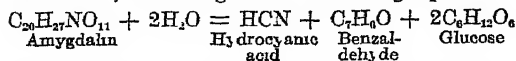
HYDROCORALLINA (Neo-Lat., from Lat. *hydra*, water snake + *corallinus*, coral red, from *corallum*, coral). An order of Hydromedusæ, including the important Paleozoic family Stromatoporidae. See **CELENTERATA**, **HYDROZOA**.

HYDROCYANIC ACID (from *hydro*-gen + *cyan*-ogen), HCN. A chemical compound, often called *prussic acid* from its having been first obtained by Scheele in 1782 from the substance known as Prussian or Berlin blue. Hydrocyanic acid is of equal interest to the chemist, the physician, and the toxicologist. The pure anhydrous acid is a limpid volatile liquid of a strong, penetrating odor resembling that of peach blossoms or oil of bitter almonds. At low temperatures it solidifies to a crystalline mass that melts at -15°C , at 18°C it has a specific gravity of 0.697, and it boils at 26°C (78.8°F). Its volatility is so great that if a drop be allowed to fall on a piece of glass part of the acid becomes frozen through the cold produced by its own evaporation. It burns with a pale-blue flame, reddens litmus paper slightly (its acid properties being feeble), and is very soluble in water and in alcohol. In the anhydrous state it is not affected either by the action of air or by that of light. In the presence of moisture, however, it is decomposed, with formation of a brown substance known as azulmic acid. If its aqueous solution is exposed to light, decomposition rapidly takes place, with formation of a number of different substances, including ammonia, formic and oxalic acids, etc.

Hydrocyanic acid is made by heating yellow prussiate of potash (potassium ferrocyanide) with dilute sulphuric acid, the reaction taking place according to the following chemical equation



In this manner a more or less dilute solution of hydrocyanic acid is obtained, and by fractional distillation and drying over calcium chloride the anhydrous acid may be prepared. An aqueous solution of hydrocyanic acid may also be obtained by shaking silver cyanide with dilute hydrochloric acid. Hydrocyanic acid occurs, both free and in combination, in various plants, and it is readily produced by macerating bitter almonds or cherry kernels with water. Bitter almonds, as well as many other vegetable products, contain a glucoside called *amygdalin* and a peculiar unorganized ferment, or enzyme, called *emulsin*. When brought into contact with water, the amygdalin is acted on by the emulsin, hydrocyanic acid being formed along with other substances, according to the following equation



Amygdalin

Hydrocyanic

Benzal-

Glucose

The dilute acid of the United States Pharmacopoeia contains 2 per cent by weight of anhydrous hydrocyanic acid, while what is known as "Scheele's Prussic Acid" contains from 4 to 5 per cent of the absolute acid. The presence of hydrocyanic acid in solutions may be best proved by one of the following methods

1 To the solution in which the presence of hydrocyanic acid is suspected, caustic potash is added to strongly alkaline reaction, then a few drops of ferrous sulphate are added, and heat is applied, the solution is now acidified with hydrochloric acid, and some ferric chloride is added. If hydrocyanic acid was present in the original solution, a precipitate of Prussian blue, or at least a blue coloration, is produced.

2 A few drops of ammonium sulphide are added to the suspected liquid, and the mixture is evaporated on the water bath, the dry residue is moistened with ferric chloride, when, if hydrocyanic acid was present in the original solution, an intense red coloration is produced

The quantity of hydrocyanic acid in a solution may be determined by adding to the latter a solution of silver nitrate, separating the precipitated cyanide of silver by filtration, washing, drying, and weighing. The amount of hydrocyanic acid may be readily calculated from the weight of silver cyanide found.

We are indebted to the Italians for the introduction of hydrocyanic acid in the *matéria medica*. There are no cases in which it is so serviceable as in those affections of the stomach in which pain is a leading symptom, as in gastrodynia, water brash, and in cases of intense vomiting. It is also useful in allaying spasmodic cough and has been employed with advantage in chronic skin diseases, to allay pain and irritation, no matter what the cause. A mixture of one part of the dilute acid (of 2 per cent strength) with about 48 parts of water forms a good lotion.

Hydrocyanic acid is one of the most energetic poisons known. A single drop of the pure acid causes instant death if placed inside the eye. When a small poisonous dose (about half a dram of the 2 per cent acid) has been taken, the first symptoms are weight and pain in the head, with confusion of thought, giddiness, nausea (and sometimes vomiting), a quick pulse, and loss of muscular power. If death result, this is preceded by tetanic spasms and involuntary evacuations. When a large dose has been taken (as from half an ounce to an ounce of the 2 per cent acid), the symptoms may commence

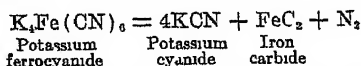
instantaneously, and it is seldom that their appearance is delayed beyond one or two minutes. The patient is insensible, his eyes are fixed, the pupils are dilated and unaffected by light, the limbs are flaccid, and the skin is cold and clammy, the respiration is slow and convulsive, and the pulse is imperceptible.

Hydrocyanic acid causes paralysis of the heart, of the respiratory centre, and of the vasomotor centre in the medulla. The spinal cord, too, is paralyzed shortly before death. The immediate cause of death is in most cases obstruction of the respiration, but in some cases it lies in stoppage of the heart's action.

Where the fatal action is so rapid, antidotes are of comparatively little value. Chlorine, ammonia, peroxide of hydrogen, cold affusion, artificial respiration are the most important agents in the treatment. Cold affusion on the head, neck, and down the spine is a valuable remedy, and it is asserted that its efficacy is almost certain when it is employed before the convulsive stage of poisoning is over, and that it is often successful even in the stages of insensibility and paralysis. One-fiftieth gram of atropine should be injected subcutaneously. Artificial respiration should never be omitted.

Among the compounds of hydrocyanic acid may be mentioned the cyanides of potassium and mercury. The more important ferrocyanides and ferricyanides are described in the articles on hydroferrocyanic and hydroferricyanic acids (qqv).

Potassium cyanide is an extremely poisonous white crystalline substance, soluble in water, but insoluble in absolute alcohol. It may be melted without undergoing chemical decomposition, its aqueous solutions, however, readily decompose on boiling. It is made on a large scale by heating yellow prussiate of potash (potassium ferricyanide), the decomposition of the latter taking place according to the following equation

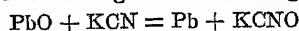


Potassium ferrocyanide

Potassium
cyanide

Iron
carbide

The cyanide is separated from the carbide of iron formed along with it, by filtering through hot porous crucibles. Potassium cyanide is largely employed in extracting gold and in electroplating. In the molten state it acts as a powerful reducing agent, readily setting free metals from their oxides, e.g., lead oxide is reduced by it according to the following equation



A double cyanide of potassium and sodium, $K_2Na(CN)_3$, is made by melting potassium ferrocyanide with metallic sodium and, after cooling, extracting the product with water and evaporating the aqueous solution.

Mercuric cyanide, $\text{Hg}(\text{CN})_2$, may be obtained by heating potassium ferrocyanide with mercuric sulphate in water, or by dissolving mercuric oxide in aqueous hydrocyanic acid. It is a colorless substance of a bitter metallic taste and is moderately soluble in water and in alcohol. When heated, it decomposes into metallic mercury and cyanogen gas. It is very poisonous, but is, in highly dilute solution, sometimes useful in syphilis and in diphtheria.

HYDRODICTION, hī'drō-dik'ti-ōn. A genus of green algæ (Chlorophyceæ, q v), whose species are called "water nets." The hollow

"net" constitutes one of the most remarkable of plant colonies, floating freely, and sometimes attaining a length of a foot or more. It is formed by an end-to-end union of long cylindrical cells (each of which is an independent one-celled plant) in such a way as to form polygonal meshes, three or four cells abutting at each junction.

HYDRODYNAMICS (from Gk *ὕδωρ*, *hýdōr*, water + *δύναμις*, *dýnamis*, power, from *δύνασθαι*, *dýnasthai*, to be able). Strictly speaking, that branch of mechanics which is the application of dynamics to liquids, it should therefore include both the statics and the kinetics of liquids, i.e., a study of their properties both when they are in equilibrium and when not. In general, however, the former phenomena are treated separately under hydrostatics (*qv*), leaving for hydrodynamics simply the phenomena of kinetics. Further, although gases are easily compressed, while liquids are not, yet, if a gas is flowing slowly and without great fluctuations, it will have properties closely resembling those of a flowing liquid. Consequently hydrodynamics also includes most of the phenomena of the kinetics of gases. If a liquid is flowing regularly through a tube of an irregular cross section, or if a gas is flowing slowly and regularly through such a tube, the mass of the fluid which passes each point in the tube in a given time must be the same; otherwise there would be a state of compression or rarefaction somewhere in the tube, it follows, then, that where the tube is narrow the velocity must be large, and conversely, like a river flowing first through a lake and then through a narrow channel. If the velocity at any point in the tube is greater than at another, it shows that there must be a force acting in the direction from the second point towards the first, so as to increase the velocity of the moving fluid, but the force must always be produced by a fall in pressure, and so the pressure at the second point is greater than at the first. It follows, then, that in a fluid flowing in a *steady state* where the velocity is small the pressure is large, and conversely if friction is supposed to be excluded. This general principle is illustrated by the "ball nozzle," the injector of a boiler, the common atomizer, the "ball in the fountain" experiment, and many others. If a fluid is flowing through a long pipe, e.g., water or gas in city mains, there is of course always a great amount of friction between the moving fluid and the layer that sticks to the tube. Owing to this, the pressure decreases along the pipe, and the velocity of flow is decreased also.

If an opening is made in the side of a vessel containing a liquid, the latter will make a jet out into air. If the opening is a small one in a *thin* wall, it may be observed that the cross section of the jet a short distance from the wall is less than that of the opening itself; this place of smallest cross section is called the "vena contracta." If a quantity of liquid of mass m escapes, having a velocity v , its kinetic energy is $\frac{1}{2}mv^2$. This energy is evidently due to the fact that the effect inside the vessel is just as if these m grams had been taken off from the free surface, and so, if the centre of the opening is at a depth h below the free surface, the m grams have lost an amount of potential energy mgh . Therefore

$$mgh = \frac{1}{2}mv^2, \text{ or } v^2 = 2gh$$

This value of the velocity of efflux was first

deduced by Torricelli, the pupil of Galileo. This theorem may be stated in a slightly different way. The liquid is forced out owing to a difference of pressure on the two sides of the opening equal to ρgh . (See **HYDROSTATICS**.) Calling this difference of pressure P , the formula for v becomes

$$v^2 = 2 \frac{P}{\rho}$$

In this form it may be applied to the rate of escape of a gas from a vessel through a small opening in a thin wall. It is seen that the square of the velocity of efflux varies inversely as the density of the gas and directly as the pressure forcing the gas out, i.e., as the difference of the *partial* pressures of that particular gas on the two sides of the opening, regardless of what other gases are present or what their pressures are. (See **DIFFUSION**.) If the escape of the fluid takes place through a thick wall or through a tube, the phenomena are entirely different, owing to friction. It is observed that the rate of escape is independent—within certain limits—of the material of the tube, showing that there is a layer of the fluid adhering to the inner walls of the tube, thus forming a tube of the fluid through which the flow takes place. The following formula has been found by experiment to hold approximately for capillary tubes

$$v = \frac{Pr^2}{6\eta l},$$

where r is the internal radius of the tube, l is its length, and η is a constant.

If an obstacle is placed in a stream of liquid or of gas, it experiences certain forces. One of the most interesting cases is that of an oblong solid in a fluid stream, it will tend to place itself with its length at right angles to the current. This is illustrated by the fact that when a small piece of paper falls it does not do so edge down, but face down, if a coin is dropped in water, it falls face down, "wobbling" as it sinks. (See **PROJECTILE**.) Other cases of fluid motion are too difficult for discussion here. It should be noted, however, that there are two great divisions of such motions, irrotational and rotational. The former is such that, if a small portion of the fluid were suddenly solidified and freed from the rest of the fluid, it would have simply motion of translation, no rotation. The latter is such that, if a small portion of the fluid were suddenly solidified and freed from the rest of the fluid, it would be spinning round a definite axis. It was proved theoretically by Lagrange that, if a certain portion of a perfect fluid free from viscosity were set in irrotational motion, it would never have its character changed (if certain conditions are satisfied, as they would be in general). Helmholtz has proved, further, that, if a portion of a perfect fluid is moving rotationally, it will always do so, and that it is as impossible to produce this motion in a perfect fluid as it is to destroy it. He showed, too, how lines can be imagined drawn in the fluid so that at each of their points they coincide with the axis of rotation of the portion of fluid at that point. Such a line is called a vortex line, and a "solid" tube made up of such lines is called a vortex. A vortex once existing in a perfect fluid moves through it, keeping its identity, i.e., always being made up of the same particles and preserving certain

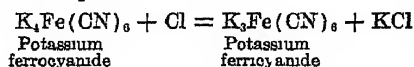
other properties. If two vortices were to collide, they would rebound, being perfectly elastic. Many of the properties of vortices can be imitated by smoke rings, but the air is, of course, not a perfect fluid, and so the vortices do not persist. Consult Basset, *Treatise on Hydrodynamics* (Cambridge, 1888), G. G. Stokes, *Mathematical and Physical Papers* (5 vols, New York, 1880-1905); A. G. Webster, *Dynamics of Particles and of Rigid, Elastic, and Fluid Bodies* (1b, 1904); Horace Lamb, *Hydrodynamics* (3d ed, 1b, 1906).

HYDROELECTRIC DEVELOPMENT See WATER POWER AND WATER DEVELOPMENT

HYDROELECTRIC PLANTS. See WATER-POWER PLANTS

HYDROFERROCYNANIC ACID (from *hydro-gen* + *ferricyanic*), $\text{H}_3\text{Fe}(\text{CN})_6$. A brown crystalline substance obtained by decomposing potassium ferricyanide with dilute mineral acids in aqueous solution.

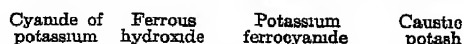
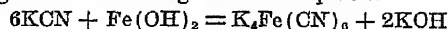
Potassium ferricyanide, or red prussiate of potash, $\text{K}_3\text{Fe}(\text{CN})_6$, is a dark-red soluble crystalline salt obtained by passing chlorine gas into solutions of potassium ferrocyanide (see **HYDROFERROCYNANIC ACID**), the transformation of the latter taking place according to the following chemical equation:



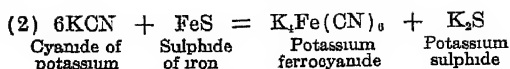
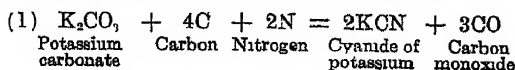
Potassium ferricyanide is used principally for making *Turnbull's blue*, or ferrous ferricyanide, $\text{Fe}_3[\text{Fe}(\text{CN})_6]_2$, which is prepared by mixing potassium ferricyanide with ferrous salts in aqueous solution.

HYDROFERROCYNANIC ACID (from *hydro-gen* + *ferricyanic*), $\text{H}_3\text{Fe}(\text{CN})_6$. A white crystalline substance readily soluble in water and in alcohol. If exposed to the air, it soon assumes a blue coloration. It may be obtained in the free state by decomposing an aqueous solution of its potassium salt with dilute mineral acids.

The ferrocyanide of potassium, $\text{K}_4\text{Fe}(\text{CN})_6 + 3\text{H}_2\text{O}$, often called yellow prussiate of potash, is a yellow crystalline substance produced when a solution of potassium cyanide is boiled with ferrous hydroxide, the reaction taking place according to the following chemical equation:



On a large scale potassium ferrocyanide was formerly made from animal refuse, such as dried blood, hair, horn shavings, etc. These products were charred and then heated to a high temperature with scrap iron and crude potash. By this process the potassium carbonate contained in crude potashes combined with the carbon and nitrogen of the refuse, yielding potassium cyanide, on the other hand, the scrap iron combined with the sulphur likewise contained in crude potash, forming sulphide of iron, and when potassium cyanide combines with iron sulphide, potassium ferrocyanide is produced. The chemical transformation taking place during this manufacturing process may therefore be represented by the following equations:



Large quantities of potassium ferrocyanide are at present made also from one of the by-products of the manufacture of coal gas. When coal is heated out of contact with air, part of its nitrogen is obtained in the form of ammonium cyanide. In the manufacture of illuminating gas the cyanogen thus produced is for the most part retained by the iron oxide used in purifying the gas, and when the iron oxide has become useless for the latter purpose, it is employed in making potassium ferrocyanide after another valuable product, ammonium sulphocyanate, has been extracted from it with warm water. The mass remaining behind is mixed with lime and heated with steam, the calcium ferrocyanide thus produced is first transformed into potassium-calcium ferrocyanide $\text{K}_2\text{CaFe}(\text{CN})_6$, by boiling with potassium chloride, finally, potassium ferrocyanide is obtained by heating the potassium-calcium salt with caustic potash.

Potassium ferrocyanide is extensively used for the manufacture of potassium cyanide and of Prussian blue as well as for a variety of other purposes.

Prussian blue, or Berlin blue, ferric ferrocyanide, $\text{Fe}_4[\text{Fe}(\text{CN})_6]_3$, is obtained by mixing potassium ferrocyanide with ferric salts in aqueous solution.

HYDROFLUORIC ACID (from *hydro-gen* + *fluor-ine*), HF. An acid compound of hydrogen and fluorine, analogous to hydrochloric, hydrobromic, and hydriodic acids, and first obtained by Scheele in 1771. It may be prepared by the action of sulphuric acid upon cryolite (q.v.) in an appropriate apparatus made of lead or of platinum. It may thus be readily obtained in liquid form, or rather in the form of an aqueous solution. The anhydrous acid may be obtained by heating acid potassium fluoride. As thus prepared, hydrofluoric acid is a colorless liquid, boiling at 19.5°C (67.1°F). Its vapors are exceedingly poisonous, and the liquid itself, even when mixed with more or less water, causes swellings on the skin that heal with extreme difficulty. Great care must therefore be taken in working with the acid. The density of the vapor is at ordinary temperatures abnormally high, showing the presence of a large proportion of double molecules H_2F_2 , in the vapor. As the temperature rises, these gradually break down, and at 88°C (190.4°F) the density attains the normal value corresponding to the simple formula HF. Solutions of hydrofluoric acid are used in analytical chemistry for breaking up minerals that are insoluble in strong hydrochloric and sulphuric acid. Another way of breaking up such minerals consists in fusing them with the carbonates of sodium and potassium, but then, of course, the amounts of these metals in the mineral cannot be determined, and hence it is usually necessary to treat a separate portion of the mineral with hydrofluoric acid. Hydrofluoric acid dissolves glass, forming hydrofluosilicic acid (H_2SiF_6) with its silica, hence its use for making etchings on glass, the acid being for this purpose often replaced by its ammonium and certain other salts (See **ETCHING**). The acid is now often kept in bottles made of a waxlike substance called "ceresin".

Among the salts of hydrofluoric acid, or fluorides (see **FLUORINE**), may be mentioned

those of the alkalis, which form an interesting series of double salts with the fluorides of other metals. The double fluoride of potassium and hydrogen (acid potassium fluoride) has been already mentioned as a source of pure hydrofluoric acid.

HYDROFLUOSILICIC ACID. See HYDROFLUORIC ACID.

HYDROGEN (from Gk *ὑδωρ*, *hydōr*, water, + *-γενής*, *-genēs*, producing, from *γίγνεσθαι*, *gignesthai*, to become). A gaseous element, discovered in 1766 by Cavendish, who called it "inflammable air." Paracelsus had already obtained hydrogen by treating iron with dilute mineral acids. But the existence of gases essentially different from air was not generally recognized until about the middle of the eighteenth century, and the properties of hydrogen gas were not definitely known before the researches of Cavendish. Lavoisier recognized its elementary nature and gave it its present name. In the free state hydrogen is found in the exhalations from volcanoes, in the gases issuing from the salt beds at Stassfurt and Wieliczka, in gases given off by oil wells, in the intestinal gases of animals, etc. The spectroscope reveals its existence in the atmosphere of the sun and of many stars, and it has been found "occluded" in meteorites and in various minerals. In combination it occurs as water, of which it forms nearly one-ninth by weight, and as a constituent of almost all organic matter. It may be obtained by the electrolysis of acidulated water, by the action of sodium, potassium, calcium, and certain other metals (e.g., superficially amalgamated aluminium) on water, by passing steam over red-hot iron wire, etc. One of the most convenient methods consists in allowing dilute hydrochloric acid, or preferably dilute sulphuric acid, to act on metallic zinc. Owing, however, to the impurities ordinarily present in zinc as well as in mineral acids, the hydrogen thus obtained is impure and has a disagreeable odor. Another convenient and economic method consists in electrolyzing a weak solution of sulphuric acid between lead electrodes, or a solution of caustic soda between electrodes of iron. Still another excellent method consists in decomposing the hydride of calcium with water. Various methods have also been employed for purifying the hydrogen first obtained. In 1909 Kammerlingh Onnes succeeded in obtaining a quantity of exquisitely pure hydrogen by freezing out the impurities with the aid of liquid air, the hydrogen itself, of course, refusing to condense. A large percentage of hydrogen is contained in ordinary coal gas, in which it is formed as a product of the destructive distillation of coal (organic matter). Much hydrogen is also contained in ordinary water gas, in which it is formed by the action of red-hot coal on water vapor.

Hydrogen (symbol H, atomic weight, either 1, the standard of atomic weights, or 1.008 when the figure 16 for oxygen is adopted as the standard, see ATOMIC WEIGHTS) is a colorless, tasteless, and odorless gas, whose critical temperature is -242°C , the critical pressure being 15 atmospheres (about 225 pounds to the square inch). It was first solidified in 1899 by causing it rapidly to evaporate when in the liquid state. In the gaseous state it is the lightest substance known, being $14\frac{1}{2}$ times lighter than atmospheric air and about 256,000 times lighter than the mineral platinum.

One liter, at 0°C and under normal atmospheric pressure (760 millimeters of mercury), weighs 0.089873 gram. In accordance with the atomic and molecular theory, the molecule of ordinary gaseous hydrogen is assumed to consist of two atoms and is therefore usually represented by the formula H_2 . The gas burns in the air with a nonluminous flame of very high temperature, combining with the oxygen to form water. When pure, though it cannot support animal life, hydrogen is not poisonous, and, when mixed with a sufficient quantity of oxygen or atmospheric air, may be inhaled for some time without inconvenience, but it weakens the voice and renders it high-pitched. Hydrogen gas is capable of being absorbed by certain metals, such as iron, platinum, and especially palladium. Graham, who studied this phenomenon, maintained that when thus "occluded" hydrogen assumed a true metallic form, and named that form of the element *hydrogenium*. Troost and Hautefeuille, too, believed that hydrogen is capable of forming alloys with metals, and some of the alloys obtained by them were found to have the composition of true chemical compounds, e.g., the hydride of sodium, NaH , the hydride of potassium, KH , the hydride of calcium, CaH_2 , etc. Hydrogen is also taken up in large quantities by colloidal solutions of platinum and palladium. (See COLLOIDS.) At ordinary temperatures hydrogen is chemically inert towards most of the other elements; with chlorine, however, it combines gradually in diffused, and with explosive violence in direct, sunlight. Its mixture with double its volume of oxygen explodes violently if ignited, the explosion is somewhat less violent if instead of two volumes of oxygen, about two and a half volumes of air are mixed with one volume of hydrogen. However, Baker showed, in 1902, that, if the mixture of hydrogen and oxygen is perfectly dry, the two gases refuse to combine, no matter how high the temperature to which they are exposed—a remarkable fact, indicating that the mechanism of the reaction is by no means so simple as may be inferred from its chemical equation as usually written. At elevated temperatures, or when in the nascent state (i.e., while being formed, say, by the action of dilute acid on zinc), hydrogen is a powerful reducing agent, i.e., it readily abstracts oxygen from compounds or adds itself to them. Nascent hydrogen is thus often employed in the preparation of organic compounds from given materials. With oxygen hydrogen forms two different compounds—water, H_2O , and hydrogen peroxide, H_2O_2 . With sulphur it combines directly, at the boiling temperature of the latter, forming sulphuretted hydrogen, H_2S . The ordinary compound of hydrogen with nitrogen is ammonia, NH_3 , another compound of hydrogen and nitrogen, termed hydrazine, has the formula N_2H_4 . Hydrochloric acid, HCl , is the compound of hydrogen with chlorine, the two elements combining, as stated above, under the influence of sunlight at ordinary temperatures. At somewhat elevated temperatures hydrogen similarly combines with the vapors of bromine and iodine, forming respectively hydrobromic acid, HBr , and hydriodic acid, HI . For the compounds of hydrogen with phosphorus, see PHOSPHORUS. For its compounds with carbon, see HYDROCARBONS.

Among the ordinary uses of hydrogen may be mentioned its use for the production of high temperatures, as in the oxyhydrogen flame. In

illuminating gas hydrogen acts as a diluent for the light-giving constituents, and its combustion yields much of the heat upon which the luminosity of the flame depends. On account of its great lightness hydrogen is used to give buoyancy to balloons.

HYDROGEN, SULPHURETED. See SULPHURETED HYDROGEN.

HYDROGEN DIOXIDE, PEROXIDE OF HYDROGEN, or OXYGENATED WATER, H_2O_2 . A colorless compound of hydrogen and oxygen containing, for the same amount of hydrogen, twice as much oxygen as is contained in water. It was discovered in 1818 by the French chemist Thénard. Minute quantities of it occur in the air, in rain water and in snow, and, according to some, in the juices of certain plants. In 1908 Keiser and McMaster demonstrated its presence in the water produced by burning hydrogen in oxygen, and, similarly, minute quantities of it are produced in the combustion of various organic substances, like alcohol, ether, etc. It may be prepared by the action of cold diluted hydrochloric, sulphuric, or nitric acid on hydrated barium peroxide. It can also be prepared by the action of hydrofluoric, hydrofluosilicic, or phosphoric acid on barium peroxide, or by slowly adding barium peroxide to distilled water through which is passed a rapid stream of pure carbon dioxide, and it has been prepared on a somewhat large scale by the action of acids on the peroxide of sodium. By any of these methods the peroxide is obtained in the form of a dilute aqueous solution. This may be concentrated by allowing the water to freeze out, or by passing a current of dry air through the solution kept at ordinary temperatures, or by allowing it to evaporate in a vacuum over sulphuric acid. The anhydrous peroxide thus obtained is a colorless, odorless, oily liquid with a harsh, bitter, metallic taste. It remains unfrozen at $-20^{\circ} C$, but crystallizes at the temperature of a mixture of solid carbon dioxide and ether. The crystals melt at $-2^{\circ} C$. When heated to the boiling point of water, it decomposes with violence into oxygen and water. When brought in contact with the skin, it causes a white blister, which after a time produces an irritating, itching sensation. It is a powerful bleaching agent and is largely used to remove color; it is particularly valuable for bleaching ostrich feathers, bones, ivory, silver, wood, silk, cotton, etc. Dilute solutions of it under special trade names are employed to produce a light color in hair. It has also been used to restore paintings that have become darkened by age. The peroxide is very useful in medicine and surgery as an antiseptic, rapidly destroying pus and similar discharges, in consequence of which it has been employed in diphtheria. Hydrogen dioxide has the power of freeing water from microorganisms, which has led to its use in brewing. It also destroys the acid and mold ferments in the wort. If taken internally, it has the effect of improving digestion and has therefore been used in certain forms of dyspepsia. Ordinarily the peroxide acts as a strong oxidizing agent, owing to the ease with which it parts with half of its oxygen. In certain cases, however, the same property has the effect of causing reduction. This happens, viz., whenever the peroxide is brought into contact with substances like oxide of mercury and especially potassium permanganate, which readily undergo decomposition. The reduction of such substances

is accompanied by the evolution of much heat, great volumes of oxygen being given off by the peroxide itself as well as by the substances undergoing reduction. The peroxide itself is readily decomposed into water and free oxygen by mere contact with certain substances, e.g., gold, platinum, and especially silver, without the metals undergoing any change, the action is particularly violent if the metals are in colloidal suspension. Among the substances that have this effect on the peroxide are most alkalies, and hence the peroxide can only be preserved in slightly acid solution, although, as Allain showed in 1906, common salt is a better and more desirable preservative of hydrogen peroxide than acids. According to Bredig, the decomposition of hydrogen peroxide by colloidal platinum is prevented by the presence of a little iodine. Before using such a solution a few drops of ammonia may be employed to neutralize the acid.

HYDROGEN SULPHIDE. See SULPHURETED HYDROGEN.

HYDROGRAPHIC OFFICE. A government institution for the preparation, publication, and distribution of charts and nautical information. In nearly all countries it is a bureau, or branch of a bureau, in the department of the navy or marine. The principal hydrographic offices of the world are the British, French, United States, Russian, German, Italian, Japanese, Netherlands, and Spanish, but several other nations have such establishments. The United States office is third in the number of different charts published. It was formally established by Act of Congress approved June 21, 1866, but had been in the course of development under the name of the Depot of Charts and Instruments since 1830. In 1842 the present bureau system of the navy was established, and the Depot of Charts and Instruments was attached to the Bureau of Ordnance and Hydrography as the hydrographic branch of that bureau, and embraced the United States Naval Observatory and the Hydrographic Office. From 1844 to 1861 Lieutenant (afterward Commander) M. F. Maury was in charge of the depot, and during this time he greatly developed—almost created—the science of marine meteorology and oceanography.

Previous to 1866 only a comparatively small number of charts of ordinary navigational type were published; but Maury compiled a vast amount of data derived from the log books and reports of men-of-war and merchant vessels, and, after drawing from the data the proper conclusions, he published the results in the form of "Wind and Current Charts," which included track charts, trade-wind charts, whale-feeding-ground charts, storm and rain charts, and thermal charts.

The present Hydrographic Office is a branch of the Bureau of Navigation of the Navy Department. It is composed of the divisions of Chart and Book Supply, Chart Construction, Sailing Directions, and Pilot Chart and branch offices. The head of the office, who has the title of hydrographer, is a naval officer, usually a commander or captain, and he has another naval officer as his assistant.

The office publishes charts of the oceans and of foreign coasts and harbors, also charts of the Great Lakes and general sailing charts of the United States coast and insular possessions. The detail charts of United States territory are

published by the Coast and Geodetic Survey (qv). Pilot charts are published covering the north Atlantic, south Atlantic, north Pacific, south Pacific, and Indian oceans. These charts show the probable direction and force of winds, position of derelicts or other dangers to navigation, storm tracks, areas of fog or icebergs, best tracks for vessels to follow, ocean currents, and a great mass of other matter useful to mariners. About 150,000 of these charts are printed annually, nearly half the number being of the north Atlantic. The north Atlantic, north Pacific, and Indian Ocean pilot charts are published monthly, the others, quarterly. A pilot chart of the Great Lakes is issued at intervals. The information given by the pilot charts is supplemented by a weekly publication called the *Hydrographic Bulletin*, of which 250,000 are issued annually.

The office publishes weekly a pamphlet of several pages, called *Notices to Mariners*, which gives a definite account of all newly discovered rocks, shoals, and other dangers to navigation, also changes in the character or position of lighthouses, buoys, and other navigational aids. It publishes from time to time revised lists of lighthouses, buoys, etc., throughout the world, and volumes, entitled *Sailing Directions*, which contain full information in regard to ocean currents, the weather, and the character of the seacoasts in the different parts of the world, descriptions of harbors, of aids to navigation, and of other matters of interest to navigators and mariners generally. The office also publishes *Bouditch's Practical Navigator* (qv), *Azimuth Tables*, *Projection Tables*, and similar works. There are printed annually 10,000 to 15 000 copies of books.

On July 1, 1914, the number of different engraved charts was about 1300 and of lithographed charts about 700.

For the purpose of gathering and disseminating information of interest to mariners and to assist them as much as possible, branch hydrographic offices have been established in the ports of Boston, New York, Philadelphia, Baltimore, Norfolk, Savannah, New Orleans, Galveston, San Francisco, Portland, Port Townsend, Duluth, Sault Sainte Marie, Chicago, Cleveland, and Buffalo. Others will probably be established at Colon, Honolulu, and Manila if Congress grants sufficient money for the purpose.

Three to five small vessels of the navy are engaged, under the direction of the Hydrographic Office, in surveying in various parts of the world, chiefly in the West Indies and on the coasts of Central and South America. Additional surveys are frequently made by naval vessels in regular service. A number of small vessels of the British navy are engaged in hydrographic surveying in parts of the world under British jurisdiction or belonging to countries that make no surveys. Similar work, on a smaller scale, is done by several other governments. Each national hydrographic office reproduces the charts of the others as far as its requirements are supposed to make necessary.

For further information, consult Hughes, *Founding and Development of the Hydrographic Office* (Washington, 1887), *The Origin and Mission of the Hydrographic Office* (Hydrographic Office Pamphlet, 1910), *Annual Reports of the Hydrographer to the Bureau of Navigation* (Washington). See HYDROGRAPHY, CHART, MAP, and section on NAVY under UNITED STATES.

HYDROGRAPHY (from Gk ὑδωρ, *hydōr*, water + -γραφία, *-graphia*, writing, from γράφειν, *graphein*, to write). That branch of the science of physical geography which treats of the surface waters of the earth particularly with reference to their bearing on navigation. Practically every civilized nation, and particularly all maritime nations, have special governmental departments whose duty it is to survey and chart the navigable waters belonging to the nation and also the waters of the oceans wherever navigation extends.

The first step in the modern science of hydrography was made in the fifteenth century by Prince Henry, "the Navigator," who was the first to make a sea chart worthy of the name. But little was done in the way of hydrographic work until Capt James Cook of the British navy began his famous career of exploration and surveying in 1759. His first work was the survey and mapping of the St Lawrence River from Quebec to the ocean. In 1763 he was appointed "marine surveyor of the coast of Newfoundland and Labrador," and he held this office until 1767. During this time he both made charts and wrote volumes of sailing directions and also began to make a name for himself as a mathematician and astronomer. Until his death, in 1779, he continued to explore and survey in the Indian Ocean and the Pacific. While Cook was collecting data and charting them, Alexander Dalrymple wrote an essay on marine surveying, which was published in 1771. Upon the founding of the British Hydrographic Office, in 1795, Dalrymple became its first chief. Cook was followed by La Pérouse, who was sent out by the French government in 1785. After some years of work La Pérouse was wrecked near Australia, and all hands are believed to have been lost. In 1791 another French exploring expedition was sent out under the command of D'Entrecasteaux and did much work in the great Eastern Archipelago. Beautemps-Beaupré, the navigating officer of this expedition, wrote a work on marine surveying which was published in an appendix to the narrative of the voyage (1808). Beautemps-Beaupré was afterward placed in charge of the survey of the French coast.

The British Hydrographic Office was established in 1795. Up to this time very few charts were duplicated, and still fewer were based on regular surveys. Charts of the oceans and coasts were very indefinite as to depths and exact positions of coast lines. When near the coast, most vessels depended upon the lead or upon local pilots. The French Bureau of Hydrographic Surveys, which was organized in 1781, led the way in chart production, but its work was greatly checked by the financial condition of the country and nearly destroyed by the French Revolution.

The British Hydrographic Office was established at a fortunate time, as its development was continuous. It is to-day the greatest of the national hydrographic offices and publishes charts of every part of the world. The French office is second, and that of the United States (see HYDROGRAPHIC OFFICE) third. In addition to the Naval Hydrographic Office, the United States has a Coast and Geodetic Survey, which prepares and publishes charts of the coast both of the United States and its insular and territorial possessions.

The first records we have of charts in which

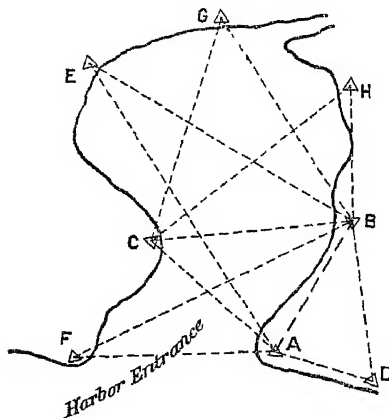
there was an attempt to locate places by latitude and longitude appear in the maps of Claudius Ptolemy, of Alexandria, in the second century A.D. The charts of Columbus were not much more definite. It was therefore the province of the newly established hydrographic offices to collect and prepare all existing data and publish them. Up to this time the few existing charts had been put out by private publishers.

During the latter part of the eighteenth century and early part of the nineteenth much was gained. By the middle of the nineteenth century the many exploring expeditions had covered the navigable world, and their work had been charted. The next step was a greater accuracy in the determination of geographic positions and a more careful survey of coasts, especially of the coast of countries which did not make their own surveys. The work is yet far from completed, but practicable charts have been issued of nearly all coasts and harbors in the world. The constant changes due to the erosion of the sea and deposit of the rivers and tides necessitate frequent resurvey in many places to make the charts safe to navigate by. Parts of the United States coast and many of its harbors have to be resurveyed every 10 years. Some harbors with shifting sand bars at the entrance have to be examined and the buoys shifted two or three times a year.

The method of conducting the hydrographic survey of a harbor, bay, inlet, or other small body of water, is as follows. Two points, whose exact location has been determined by some general survey of that portion of the country, are selected to form the base. (See GEODESY.) If the exact locations of two points and the distance between are known, this distance is assumed as the base. If the distance is not known, it is measured by base apparatus (copper bars incased in wood and supported on trestles) or by a steel or invar tape, the tape being kept carefully taut and at a constant and determined tension, level, and in a straight line between the points. The base having been established, various other points about the harbor are located by triangulation. If the existing objects are not well spaced about the harbor, additional tripod or pole structures must be erected. For ordinary work sextant angles suffice, but for larger or more exact triangulation theodolites are used and great care taken with the observations and computations. The first triangles are formed with the base as one of the sides and the point to be located as the vertex of the opposite angle. All three angles are measured, and the sum should not be less than 180° nor more than $180^\circ 1'$, unless the distances are short and the survey a small one. Angles of less than 30° are to be avoided unless observed with great care and exactitude. After several points have been located from the base line other triangles are formed, using these points for vertices, and so on until the requisite number of stations—or "signals," as they are called—is reached.

The next step is to prepare a plan of the harbor (or area to be surveyed) on a suitable scale for the work—1 to 2500 (i.e., 1 foot on the chart represents 2500 feet) is a common one, but in important harbors and channels 1 to 500 is sometimes necessary. The base line is laid down upon the chart, and then the other points which have been determined by the triangulation survey. The shore line and topo-

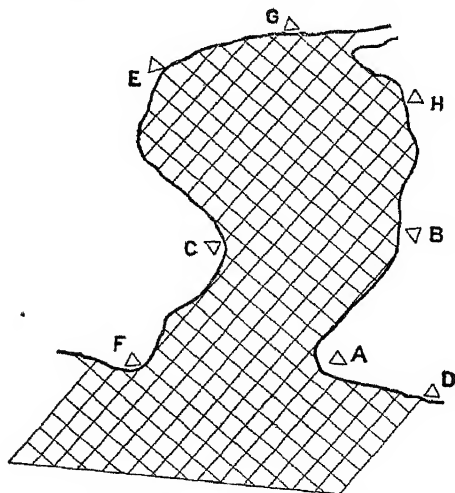
graphical features are next obtained by a topographic survey with a plane table or other instrument. For determining the shore line only, a fairly accurate method consists in running from point to point along the shore, measuring changes of direction by a theodolite and



TRIANGULATION FOR SURVEY OF A HARBOR
A B, base Triangles, ABC, ABD, ABE, ABF, BCG, BCH

distances with a surveyor's chain or steel tape. At such frequent intervals as may be necessary the distance to the water's edge is measured at right angles to the direction in which the lines are run from point to point.

Having determined the shore line, the plan for sounding is prepared. The lines on which the soundings are desired (and on which the boat is to run) are then placed on the plan (or boat sheet, as it is called). There are usually two sets of these lines, one set intersecting the other at right angles, but this arrangement is



PLAN OF HARBOR (BOAT SHEET)
Showing lines on which soundings are to be taken

frequently varied. Sometimes the lines intersect at 60° or 45° , and sometimes three sets are requisite. The lines of each set are from 100 to 1000 feet apart, depending upon the character of the survey.

Small steam launches are commonly used in hydrographic work. The leadsman stands in

a convenient framework near the bow. Two observers, each with a sextant, are aft, also a recorder with a watch and a notebook to record angles and soundings. The boat proceeds at constant speed and is kept on as straight a course as possible by means of a range of any two objects on shore or by frequent determinations of its position. Every 10, 20, or 30 seconds (depending upon the depth and speed) a sounding is taken, the recorder giving the signal to sound. At intervals of one minute or more (usually two to four minutes) the position of the boat is determined by sextant angles. The observers use any three of the "signals" located by the triangulation. One measures the angle from the right object to the centre one, the other measures the angle from the centre to the left. These two angles determine the position very exactly, and it is quickly plotted on the sheet by means of an instrument called a three-arm plotter. If this position shows the boat is drifting away from the desired line, the necessary change in course is made.

While this is going on, the heights of the surface of the water on a near-by tide gauge must be observed or taken by a recording instrument. If the plane of mean low water is not known, it must be determined from gauge observations (preferably for at least two months) of low waters. The average height of all the low waters for the observation interval is taken as mean low water. All soundings taken are reduced to this plane before being placed on the finished chart. They are spaced in by time between the positions determined by sextant angles.

Offshore soundings are usually made from a surveying ship of 100 tons or more. The ship determines her position by angles as long as she can see the shore and then spaces her soundings by time. Deep-sea soundings are taken by large vessels especially fitted with a deep-sea sounding machine. This consists of a wire, a shot or sinker, a tube for obtaining temperatures and character of the bottom, and a machine which controls a reel for letting out or hauling in the wire. The shot or sinker is usually released and left behind when it strikes the bottom. This relieves the strain on the wire in reeling in, and this relief is necessary in very deep sounding.

In addition to determining the depths and tidal rise and fall in a harbor it is desirable also to ascertain the speed and direction of the current. This may be done by means of the old-fashioned chip log, the observations being taken at suitable intervals. An easier and more satisfactory method to ascertain the speed is to employ a recording current meter. Direction meters for determining the direction of the current at any depth below the surface have been devised and are used to some extent. To determine the volume of water passing at any time, the current observations must be made at several depths and at points located at intervals all the way across the stream. Such observations show that the current on the surface of a tidal harbor is frequently in the opposite direction to that near the bottom, the conditions depending upon the state of the tide.

The finished chart (qv) is supposed to embody all the available data of use to navigators. After the soundings are entered on the plotting sheet, curves of equal depth are drawn, and only characteristic soundings placed on the final

chart. Charts are engraved or etched on copper or lithographed. Lithographic work is cheaper, but less satisfactory.

The greater part of hydrographic surveying is done in the vicinity of coasts, shoals, and islands, since it is there where lie the dangers to navigation. Deep-sea sounding is of scientific interest only, the principal commercial use being the determination of suitable routes for submarine cables. See DEEP-SEA EXPLORATION, DREDGE, HYDROGRAPHIC OFFICE, COAST AND GEODETIC SURVEY, CHART, MAP.

HYDROID (from Gk. ὑδροειδής, *hydroeidēs*, like water, from ὕδωρ, *hydōr*, water + εἶδος, *eidos*, form). One of a class of coelenterate animals, notable for their delicacy and beauty and receiving their name from their structural resemblance to *Hydra* (qv). The name is now generally restricted to the polyp forms of the *Hydromedusæ*. (See HYDROZOA.) They exist in compound colonies—one kind having the office of feeding the community, another of protecting it, and another of reproduction. The feeding hydroids are usually fixed, or attached to some object, and proceed from eggs of the reproductive hydroids, or medusæ, the latter in turn growing from buds produced by the former. The medusæ sometimes remain attached to the stem or become free-swimming. The body of the nutritive hydroid is usually supported by a stem of variable length, but may rest immediately upon the bottom. From one individual buds appear and produce branching colonies of hundreds or thousands, often having a height of 15 or 20 inches, and the giant hydroid of Japan is more than 3 feet high. The reproductive hydroids are sometimes developed into perfect medusæ before leaving the parent stem, but they usually break away before attaining their perfect state. Some buds never become much developed and are called gonophores. These usually remain attached, but attain sexuality and reproductive power. Most hydroids are covered with a chitinous envelope, which is continuous over the branching stem of the entire colony, but some species are naked and soft. In tubularian hydroids the chitinous envelope, when present, simply incloses the stem and branches, but is not expanded around the individual polyps (*hydranths*) in the form of a cup. In campanularian hydroids, however, each hydranth is surrounded by a cup, a continuation of the chitinous envelope, into which it can withdraw itself. Hydroids abound in the ocean in various parts of the world, notably the northwest coast of America, the Caribbean Sea, and around Australia. Their colors are usually not brilliant, brown, flesh color, and white being the most common. A familiar and beautiful example is the Portuguese man-of-war (qv). Consult Alexander Agassiz, *North American Acalephæ* (Museum of Comparative Zoology, Cambridge, 1875). See SIPHONOPHORA, ALTERATION OF GENERATIONS, and the accompanying illustration.

HYDROMANCY. See DIVINATION.

HYDROMETER (Gk. ὑδρομέτριον, *hydrometron*, vessel for hydrostatic measurement, from ὕδωρ, *hydōr*, water + μέτρον, *metron*, measure), also known as **AREOMETER**. An instrument used in determining the specific gravity of liquids and in some instances of solid bodies.

Specific gravity, for determining which the hydrometer is used, is the ratio between the weight of a given quantity of a substance and

that of an equal volume of water at its temperature of maximum density, 4°C , so it follows that the specific gravity of two substances must be directly proportional to their weights when the volumes are the same, or inversely as their volumes when the weights are equal. The hydrometer, which usually is a hollow instrument of glass or metal designed to float upright in a liquid, makes use of the principle of Archimedes that the weight of the volume of liquid displaced by a body is equal to the weight of the body itself. In its simplest form a hydrometer might consist of a graduated scale floating vertically in a liquid, and on which the level of the surface of the liquid it displaces could be measured. For example, an ordinary ruler if allowed to float upright in water would sink until a certain division on the scale is reached. This reading multiplied by the area of the cross section of the ruler will give the volume of a mass of water equal to that displaced by the ruler and equivalent to the weight of the ruler itself. Immersing the ruler in a liquid of different specific gravity, it will sink until the surface touches some other division on the scale, and, as before, the volume of a mass equivalent to the weight of the ruler will be obtained. A ratio made with these two quantities representing the volumes of the two liquids would give the specific gravity, but, as the cross section of the ruler is a constant quantity, it is only necessary to compare the two readings on the scale.

The ordinary hydrometer consists of a smooth, transparent glass circular tube of uniform cross section and thoroughly annealed, usually terminating in one or more bulbs, the lower of which may be filled with mercury or shot in order to keep the instrument steady with its axis in a vertical position when immersed in a liquid. Such a hydrometer is extensively used in scientific and commercial work, as it can be graduated to furnish direct readings of the specific gravity of a liquid. The mark to which the instrument would sink when placed in water is usually marked 1.000, and the weight of water displaced is equal to the total weight of the hydrometer. If the instrument be placed in a liquid that has a less specific gravity than water—alcohol, e.g.—it will sink until the surface of the liquid touches some point higher up on the stem, as in this case it takes a greater volume of the lighter liquid to be equivalent to the weight of the hydrometer. The scale on which the readings are made is on a piece of paper contained inside of the stem, and the method of graduation forms the chief distinction between the different instruments. In the instrument of Gay-Lussac, which is known as a volumeter, the water point was marked 100, and the division was carried along the stem both above and below this mark on the basis that the amount of the stem between any two scale divisions should equal $\frac{1}{100}$ of the volume of the part immersed in water. With an instrument graduated in this manner the specific gravity is obtained by dividing the reading into 100. In practice it is more convenient to use a hydrometer whose scale is graduated to read specific gravity direct, but in this event the scale is irregular, and great care must be exercised in the construction and testing of the instrument, for all accurate work a certificate from some competent authority or institution, such as the United States Bureau of Standards

that the instrument has been tested and approved, being essential. The accuracy of a hydrometer is greatly increased by making its stem as slender as possible and consequently increasing the space between the divisions, so it is customary to construct a number of instruments, each having a limited range and designed for liquids of different densities. The hydrometer, when used for a special purpose or substance, frequently undergoes modifications. The alcoholmeter, e.g., is so graduated as to give at once the strength of mixtures of ethyl alcohol and water according to either per cent by weight or per cent by volume. The urinometer, lactometer, saccharometer, and other instruments are all hydrometers used for special purposes, as is also the hydrometer for determining the strength of sulphuric acid or the strength of the acid solution of a storage battery. Elaborate tables have been worked out for use in connection with various forms of special hydrometers, and some of these will be found in *Circular No. 19, United States Bureau of Standards* (Washington, 1913). Hydrometers with arbitrary scales also play an important part in scientific work, though the present tendency is towards the exclusive use of specific-gravity values. In the Baumé scale, which is encountered frequently in chemical processes, a second fixed point on the hydrometer stem is determined in addition to that given by water. This is obtained by dissolving one part by weight of common salt in nine parts of water, and then the space between these two points is divided into 10 equal parts, which are called degrees. The water point is marked 10 on the scale, and the division is carried beyond for 40° . For liquids heavier than water the second fixed point is determined by immersion in a solution of 15 parts of salt in 85 parts of water, and the space between it and the water point, which is marked 0, is divided into 15 equal divisions. Exact tables for comparison with specific gravity will be found in *Circular No. 19*, cited above. The scales of Cairier and Beck are occasionally found, though less frequently than that of Baumé.

The accompanying tables afford a comparison of the Baumé degrees (American standard) scale with the true values of specific gravity.

LIQUIDS LIGHTER THAN WATER

SPECIFIC GRAVITY	Baumé
.75	56.7°
.80	46.3
.85	34.7
.90	26.1
.95	17.7
1.00	10.0

LIQUIDS HEAVIER THAN WATER

SPECIFIC GRAVITY	Baumé
1.1	0°
1.1	13.2
1.2	24.3
1.3	33.7
1.4	41.8
1.5	48.8
1.6	54.9
1.7	60.0
1.8	65.0
1.9	69.0
2.0	73.0

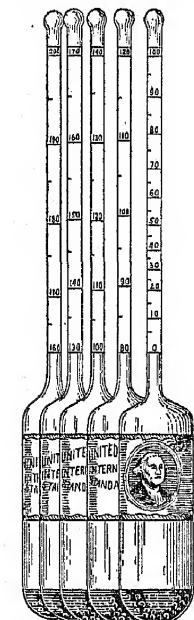
The specific gravity of liquids changes with the temperature, so that it is of the utmost importance to have the liquid at uniform and at standard temperature. It is necessary to use a thermometer and, if necessary, apply suitable

corrections to reduce the specific gravity of the liquid to the standard temperature. For this purpose many of the finer hydrometers contain within their stems a thermometer tube whose bulb is placed in the lower portion of the instrument, and the instrument is known as a thermohydrometer.

In the United States Internal Revenue Service the hydrometers furnished to the inspectors are so graduated as to indicate the number of parts by volume of proof spirit equivalent to the volume of the liquor at the standard temperature, which is 60° F. They are constructed so as to read 100 for proof spirit and 200 for absolute alcohol. Proof spirit in the United States is defined by law to be that mixture of alcohol and water which contains one-half of its volume of alcohol, the alcohol when at a temperature

of 60° F. being of specific gravity 0.7939 referred to water at its maximum density. Proof spirit has at 60° F. a specific gravity of 0.93353, 100 parts by volume of the same consisting of 50 parts of absolute alcohol, and 53.71 parts of water.

A hydrometer of a different type from those described above is the weight hydrometer, where the submerged volume remains constant; but, as the specific gravity of the liquids changes, the weight of the instrument must be varied in order to immerse it to a given point. The Nicholson hydrometer is representative of this class and consists of a brass tube with conical ends, which floats upright and carries above a thin stem the carrying pan in which may be placed a substance whose specific gravity is to be found. When used to determine the specific



SET OF UNITED STATES STANDARD HYDROMETERS AS USED BY THE INTERNAL REVENUE OFFICE.

gravity of a liquid, the weight of the apparatus is first ascertained, and then it is placed in water and weights added until a marked point on the stem is at the surface of the water. If the instrument is placed in a liquid of greater specific gravity, then additional weights must be placed on the pan in order to sink the stem to the mark, while, if the liquid is less dense, the number of the weights must be diminished. The weight of the instrument increased by the amount of the weights added when the instrument was placed in water, divided by the weight of the instrument and the weights added when the instrument was in the liquid under test, will give the specific gravity. This hydrometer can also be used to determine the specific gravity of a solid, in which case the latter is first placed in the upper pan, while the instrument is in water, and the number of weights which must be removed is noted. The substance is then placed in the lower pan, and the amount of weight which must be removed to restore it to its former position ascertained. The difference in the two amounts represents the weight of the

water displaced by the substance, and, if divided into the sum of the weights removed when the body was placed in the upper pan, will give the specific gravity. The hydrometer of Fahrenheit is based on a similar principle, but is made of glass instead of metal and has a bulb filled with mercury at its lower end instead of a weighted cup. It can only be used for liquids. These instruments are not so reliable as the ordinary hydrometers and are not so widely used. In the most accurate determinations of specific gravity a chemical balance is employed, and equal volumes of the liquid actually weighed, or, if the substance is a solid, it is weighed both in the air and in distilled water, suitable corrections being applied for temperature and other disturbing influences.

Historical. The hydrometer is without doubt one of the earliest pieces of physical apparatus, its invention being generally ascribed to Archimedes, to whom is due the principle on which it is based. The instrument is mentioned by Priscian, who died about 500 A.D., and it is also described by Synesius of Ptolemais in a letter to Hypatia of Alexandria, under the name of hydroscepium, as follows: "It is a cylindrical tube the size of a reed or pipe, a line drawn along it lengthwise which is intersected by others, and these point out the weight of water. At the end of the tube is a cone the base of which is joined to that of the tube so that both have but one base. This part of the instrument is called *baryllion*. If it be placed in water, it remains in perpendicular direction so that one can readily discover the weight of the fluid." The date of this letter can be approximately fixed by the fact that Hypatia was murdered in 415 A.D. The use of the hydrometer was known to the Saracens of the tenth and eleventh centuries, and one of their writers, Al-Khazint, attributes its invention to a Greek philosopher named Poppius, a contemporary of Theodosius the Great. In this connection this same writer refers to the fundamental discovery of Archimedes. Consult any of the larger manuals of physics, but, for special information on the hydrometer, *The Testing of Hydrometers* (Circular No. 16, United States Bureau of Standards, 3d ed., Washington, 1914); also *Standard Density and Volumetric Tables* (Circular No. 19, 3d ed., ib., 1913). The United States Treasury Department publishes, for the use of the internal revenue service, manuals for using the hydrometer in alcoholometry. See Illustration in article SPECIFIC GRAVITY.

HYDRONITRITES. See HYDRONITROUS ACID.

HYDRONITROUS ACID, HN_3 . An acid gaseous compound of hydrogen and nitrogen, first obtained by Curtius in 1890. An easy method of preparing this acid was subsequently worked out by Angeli and consists in adding hydrazine hydrate (see HYDRAZINE) to a concentrated solution of silver nitrate, the result being a precipitate of silver hydronitrite, AgN_3 , from which free hydronitrous acid may be obtained by decomposing with sulphuric acid. The salts of hydronitrous acid, or *hydronitrites*,



NICHOLSON HYDROMETER

are violently explosive compounds, and then preparation should not be undertaken by inexperienced persons.

HYDROPATHY (from Gk *ὕδωρ*, *hydōr*, water + *πάθος*, *pathos*, feeling) Water cure or water treatment. A system of treatment of diseases with water to the exclusion of other agencies. A word of incorrect composition, formerly applied to a method now obsolete. See **HYDROTHERAPY**.

HYDROPHANE (from Gk *ὕδωρ*, *hydōr*, water + *φανός*, *phanos*, clear, from *φαίνω*, *phainō*, to appear) A translucent variety of opal (qv) that is either whitish or light-colored, and becomes more transparent or translucent in water.

HYDROPHILÆ See SEA SNAKE.

HYDROPHILIDÆ (Neo-Lat nom pl, from Gk *ὕδωρ*, *hydōr*, water + *φίλος* *philos*, loving) A family of scavenger beetles, most of which swim in the water or crawl on the submerged parts of plants in quiet pools. They are elliptical black beetles with club-shaped antennæ. Because of the fact that they carry a film of air on the ventral surface of the body, this part has a silvery appearance. The larvæ are carnivorous, but the adult beetles live chiefly on decaying vegetation. There are 150 species of this family in the United States. One of the most common species is *Hydrophilus triangulatus*. A few forms live in moist earth or dung and subsist upon maggots which inhabit such places.

HYDROPHILOUS A term which has been applied particularly to plants which are pollinated through the agency of water. It has also been applied by some authors to hydrophytic plants, but should be entirely discarded there both because of its previous use in another sense and because it is an undesirable word in all senses. The term "water-pollinated" is preferable in the first sense. See **POLLINATION**.

HYDROPHOBIA (Lat, from Gk *ὕδροφοβία*, *hydrophobia*, from *ὕδροφόβος*, *hydrophobos*, dreading water, from *ὕδωρ*, *hydōr*, water + *φόβος*, *phobos*, fear), or **RABIES**, also called **LYSSA**. An acute infectious disease of warm-blooded animals produced in man by the implantation of a specific virus through the bite of an animal sick with the disease. This disease has been known since the earliest historical times. Democritus of Abdera gave an account of it in the fifth century B C. Aristotle in the fourth century B C described it in animals, but denied its existence in man. Celsus (21 B C) detailed some of its symptoms and advised suction and the actual cautery in the treatment. Xenophon, Ovid, Vergil, Horace, Plutarch, all referred to rabies in their works. Boerhaave (qv) and Van Swieten (1771) described the disease intelligently and recognized the paralytic type in man. John Hunter (qv), Magendie (qv), Marochetti, Morgagni, Trousseau, and Dupuy all wrote of it. Youatt (1850), the celebrated veterinarian, considered rabies at length in his books and relied on early cauterization with nitrate of silver to obviate infection. Yet, after being bitten seven times with impunity, he is reported to have died of rabies at the last. Viichow and Von Ziemssen propagated the disease by the hypodermic injection of saliva of a rabid animal. After many others had added to our knowledge of hydrophobia Pasteur (qv), in 1882, began to treat the disease with scientific accuracy.

The geographic distribution of the disease is wide. It has been found in Greenland, where it was epidemic in 1860, in Constantinople, where it prevailed in 1839, in Egypt, in London, in Hamburg, in Saxony, in Bavaria, and in many parts of the United States, the prevalence of the disease in Washington, D C, in 1899-1900 raising grave apprehension. During 1914 there were several outbreaks of canine rabies in various States, but few persons were bitten. In Russia and Siberia very many instances of rabid wolves have been recorded. The disease is found most frequently in the dog, the wolf, the cat, and the cow. The skunk, also, seems to be peculiarly liable to hydrophobia, and the disease in this animal has been considered distinct and worthy its own name of *rabies mephitica*. A careful consideration of all the known facts, however, leads to the conclusion that the disease is one to which all the lower animals, and man also, are liable, that it is protean in its manifestations, chiefly because of the thousand and one concomitant circumstances and elements, and that the collected statistics are mostly so tainted, from manifold sources of error, that they need to be sifted with the utmost care. It is, however, safer to treat every skunk bite as though certainly by a rabid animal, since in most cases the facts cannot be known. (The curious will find the question most interestingly discussed in a candid manner in Coues's *Fur Bearing Animals*.) The nature of the infecting virus is as yet unknown. It is found in the saliva, particularly that of the parotid gland. In man there is a variable incubation from three weeks to six months, the period depending largely on the site of the infection. Wounds about the neck and face are especially unfavorable in prognosis, next are those of the hands. Punctured wounds, because of the difficulty of cauterizing them, are most dangerous. Three stages are described. In the *premonitory stage* there is pain, numbness, or irritation about the bite. Irritability, nervousness, and depression are common. In the *stage of excitement* there is great hyperæsthesia. Almost any slight stimulus will cause intense reflex excitability and convulsions. The muscles of deglutition are extremely rigid or even paralyzed, and any attempt at swallowing may cause spasms of the throat and general convulsions, these may even follow the thought of swallowing. The name "hydrophobia" is erroneous and based upon false inferences from these facts. The sufferer from rabies does not fear water—he intensely desires it, as he is devoured with thirst, but he cannot swallow it, nor even "go through the motions" of swallowing. There is also a secretion in the throat and mouth of a thick, viscid mucus, with thickened saliva, and the effort to get rid of this with muscles refusing to act, causes the bark-like cough and hawk so often described as "barking like a dog." The patient does not bark, and it is doubtful if he bites. The temperature rises, and the patient may become maniacal. This stage may last from one to four days, and then the *paralytic stage* supervenes. In this stage the spasms stop, unconsciousness supervenes for the first time, the action of the heart ceases, and the patient dies.

The gross pathological changes found after death from hydrophobia are not characteristic. The most constant are found in the nervous system, especially in the region of the medulla.

oblongata and pons. The changes consist in a varying degree of inflammation, marked by small round-cell infiltration of the blood-vessel walls, exudation into the pericellular lymph spaces, small hemorrhages, and sometimes thrombosis of the small blood vessels. More recently microscopical study has demonstrated extensive degenerative changes in the nerve cells. Lesions have also been noted in the sympathetic, consisting in degeneration of the nerve cells and increase in the thickness of their endothelial capsules. In 1903 Negri announced the discovery of certain bodies in the nerve cells of rabid animals. These, the so-called Negri bodies, are found very constantly and are described as consisting of a homogeneous, nongranular substance, resembling coagulated albumin. They are from 1 to 23 micromillimeters in diameter, oval, round, or triangular in shape, and within them are clear shining areas. The nature of these bodies is unknown. Negri believes them to be protozoa and considers them the causative agents of the disease. Williams, in 1906, was convinced that these cell inclusions were of animal nature and called them *Neurocytes hydrophobice*. All attempts to cultivate this alleged organism, however, were unsuccessful, and the late "complement fixation test" is likewise negative. In addition to the changes in the nervous system there is usually congestion of the mucous membrane of the gastrointestinal tract and of the pharynx, larynx, and bronchi. Despite the fact that innumerable attempts to discover the cause of the disease have been made without success, it still seems probable that hydrophobia is due to an ultramicroscopic microorganism. This organism is not apparently widely distributed throughout the body, but confined mainly to the saliva and the central nervous system. An emulsion made of the medulla of a rabid animal, injected into dogs, cats, rabbits, guinea pigs, etc., produces symptoms characteristic of the disease, although in rodents there is little or none of the stage of excitement.

Although we have no knowledge as to the specific germ of the disease, hydrophobia furnishes our most remarkable example of the success of artificial immunization by means of protective inoculation. To Pasteur (qv) is due the credit not only of the discovery of the preventive treatment of hydrophobia, but of demonstrating through it a principle in therapeutics which is of constantly widening application. Pasteur found that he could induce the disease in rabbits by inoculations with portions of the spinal cords of rabid animals, and that the spinal cords of these rabbits possessed a high degree of virulence. Drying in air reduced the virulence in direct proportion to the length of the drying. It was found that, while inoculation of man or animals from the fresh rabbit cords was invariably fatal, if the man or animal was first inoculated from one of the cords the virulence of which had been greatly reduced by the drying, and then from cords of gradually increasing virulence, he could become so accustomed to the virus that injection of the fresh cord would no longer be fatal, and such a series of inoculations made sufficiently soon after the bite of a rabid animal was found to prevent entirely the development of the hydrophobia. Advantage is taken of the long period usually elapsing between the bite and the onset of the disease to practice these preventive inoculations, and the result has been a marked

decrease in the mortality from the bites of rabid animals. In view of the uniformly fatal results of untreated hydrophobia and the success of the Pasteur treatment, the importance of determining at the earliest possible moment whether the animal by whom a person has been bitten had rabies can be readily appreciated. The animal should not be killed, for, as rabies is invariably fatal to canines, the recovery of a sick animal definitely disproves rabies. On the contrary, the animal should be carefully watched and, if it dies, should be sent to a laboratory where examination can be made and the question of rabies definitely settled by inoculation experiments on animals or microscopical examination of the brain and cord. The treatment should be cauterization in every case, less than one hour after the bite, by means of the actual cautery, strong acid, or acid nitrate of mercury. Wounds must be opened by the surgeon, and even amputation may be necessary. Washing and syringing wounds with water at 130° F is desirable. Sucking the wound to draw out the poison has been practiced and may be safely done if there are no breaks of the membrane of the lips or mouth. A method recommended by Kenle is as follows: The wound is washed with bichloride solution and dried, a strong solution of carbolic acid is then applied to the depths of the wound or wounds with a suitable applicator, this is followed immediately by pure nitric acid, and this again by alcohol. A surgical dressing is then applied. Under thorough cauterization rabies develops in 33 per cent of cases bitten, without cauterization, in 83 per cent. Administration of morphine or alcohol does harm. Immunizing by the Pasteur method should be practiced in all cases. By this method the patient is inoculated with attenuated virus by the injection hypodermically of emulsion made from the brain of a rabid animal repeated in stronger and stronger concentration during 21 days. The results of the Pasteur method are now indisputable, but it is of the utmost importance to begin the treatment as soon as possible after the injury, as the prospect of success grows less and less day by day of delay. Following are the results of the antirabic treatment at the Institut Pasteur, Paris, from 1886 to 1908 inclusive: 31,330 cases were treated with 238 deaths, a mortality rate of 0.759 per cent. During treatment 50 deaths occurred, or 0.159 per cent, within a short time after treatment. 188 died, or 0.601 per cent. Reinlinger found a mortality rate of 0.41 per cent in 131,579 cases. The treatment is not entirely harmless. Besides the local and constitutional reaction there sometimes occurs paralysis or paraplegias, which occasionally prove fatal. Pasteur institutes are distributed well over the civilized world, most large cities having one. In New York City the virus is now made and distributed by the department of health. The New York State Department of Health was the first to send out treatment packets by mail. The practice of State treatment and distribution, as well as the examination of dogs, is now well organized throughout the United States.

Pseudorabies, or Lyssophobia, is a hysterical condition, in which the patient, who imagines that he has rabies, in his morbid condition of mind enacts some of the symptoms and may even be frightened to death.

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HYDROPHYTES (from Gk ὕδωρ, *hydōr*, water + φυτόν, *phyton*, plant) Plants which grow naturally either in water or in very wet soil. This term is contrasted with "mesophytes" and "xerophytes" (qv). Common illustrations of hydrophytic plant societies are swamps of all kinds, pond societies, and ocean plants. Various classes of hydrophytes are taken up under separate heads, where the main features of the various hydrophytic societies will be discussed. It will be desirable, however, to give a short account of the characteristic hydrophytic structures. The roots of hydrophytic plants are in most cases very greatly reduced and in some cases altogether lost, as in some of the duckweeds. Root hairs are also commonly lacking in water plants. The stems and leaves are not, as a whole, conspicuously reduced in water plants, but they show peculiarities of structure that are quite interesting. The leaves of hydrophytes are frequently finely divided, as in the water milfoil and mermaid weed. In many cases where the leaves are not finely divided, they are very thin, consisting of one or two layers of cells only, e.g. in tape grass. An examination of the structure of the leaves shows the entire absence of stomata in the submerged parts, an absence of air spaces in most of the ribbon-like forms, complete or almost complete absence of palisade cells, and a very thin epidermis which contains chlorophyll. In contrast with submerged leaves those floating upon the surface of the water usually have well-developed palisade cells, many stomata upon the upper side, and an abundance of intercellular air spaces. The stems suffer a noteworthy reduction in the size and development of the water-conducting vessels and mechanical tissues and a great increase in air spaces. The structures just described are found in their highest development in submerged water plants. Hydrophytes whose leaves are aerial show no conspicuous differences from ordinary land plants in most respects. One class of hydrophytes, which may perhaps be called amphibious plants, shows some remarkable variations, especially in structure. Leaves which are developed under the water show the characteristic structures outlined above, including the fine leaf division, whereas leaves of the same plant developed in the air show typical aerial leaves without these divisions and with palisade cells, stomata, and a thick cuticle. The stimulus or stimuli which cause these wide variations are not certainly known, but they are discussed to some extent in the article **LEAF**. Common American plants, which show variations to a high degree, are the aquatic buttercups, the mermaid weed, some of the cresses, and water hemlocks.

However the hydrophytic structures that have been described in the preceding paragraph may have arisen, certain advantages can be clearly seen, at least in some cases. The thin walls of the epidermis, which are in striking contrast to the thick cutinized walls of many aerial leaves, permit the easy entrance of water and substances dissolved in the water. On this account many

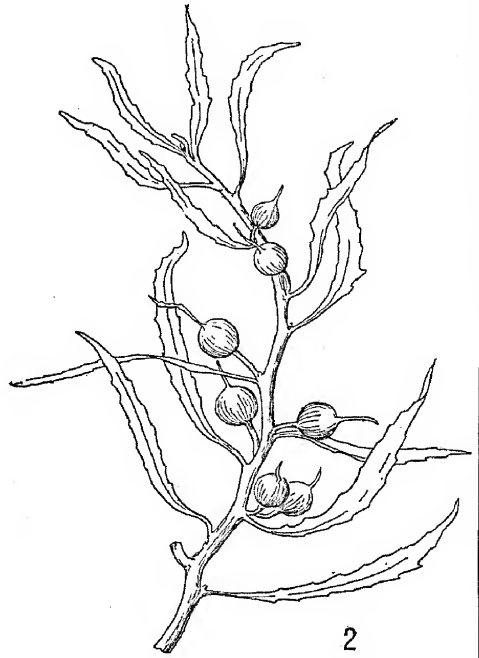
submerged plants are practically independent of soil relations, they take in most of their material directly from the water. It is easily possible to grow cultures of many of these plants without having any root connection whatsoever. While certain forms, such as the water milfoil and the water weed (*Elodea*), develop roots in ordinary aquarium cultures, other forms, such as hornwort (*Ceratophyllum*), never develop roots and yet grow quite as vigorously as in their natural rooted condition. A few forms, such as the bladderwort (*Utricularia*) and some of the duckweeds, have no roots in nature. Of course, in such cases the entire absorption of nutriment must take place through the leaf epidermis. The fact that the leaf epidermis contains chlorophyll is also a matter of advantage, since water very soon destroys the efficiency of rays of light. At a comparatively shallow depth there is a cessation of the development of green plants. A reduction in the water-conducting tissues, while not necessarily an advantage, is, nevertheless, not harmful, inasmuch as the absorption is so largely through the leaf, instead of the root as in land plants. The reduction in root development is not so easy to understand, since it would seem that holdfast organs would ordinarily be of advantage, then, again, any absorption which the roots might make would so much the more increase the capacity of the plant. A high development of air cavities is a distinct advantage, not only to help float the plant, but probably to a much higher degree to act as a sort of air storage. It can readily be seen that the conditions for obtaining air underneath the water are not of the best, and that any additional means for obtaining or for storing air would increase the plant's efficiency. The reduction in the development of mechanical tissues, of palisade cells, and of stomata is not necessarily an advantage to water plants, but since these tissues are not actually needed, the plant loses nothing by its failure to develop these structures. The peculiar leaf forms that have been noted above are, perhaps, not necessarily of any exceptional advantage. It must not be supposed that everything in a plant can be explained in accordance with the need of the plant. It is much more likely that the explanations should be referred to definite chemical and physical causes. However, in the case of finely divided leaves, it can be seen that a much larger proportion of cells comes in contact with the material than is true with the more compact air leaves. Thus, the absorption capacity of the leaf is increased. Finely divided leaves are also doubtless more able to escape the dangers coming from currents of water than leaves which are more compact.

The hydrophytic plant societies are essentially all edaphic, i.e. they are conditioned by local causes. In this respect there is a wide contrast as compared with the xerophytic plant societies. Perhaps some of the ocean formations may be conditioned by climatic causes to some extent, but the ordinary hydrophytic societies of swamps and ponds are due to essentially local conditions. Perhaps no plants have such a wide distribution as certain of the hydrophytes. This is particularly true of ocean plants, where it can easily be accounted for by the almost universal distribution of the oceans themselves. It is true, to a striking degree, as well of the pond and swamp plants. Such plants as the pond weeds, cat-tails, and bulrushes are found almost throughout the world where the habitats are favorable. Perhaps

HYDROPHYTES



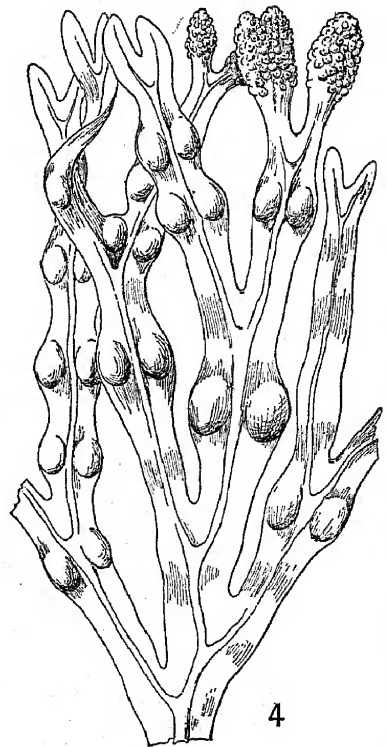
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BROWN ALGÆ

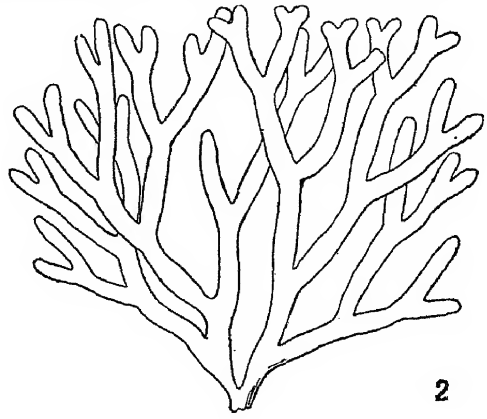
1. *Postelsia palmæformis*
2. *Sargassum bacciferum*

3. *Laminaria digitata*
4. *Fucus vesiculosus*

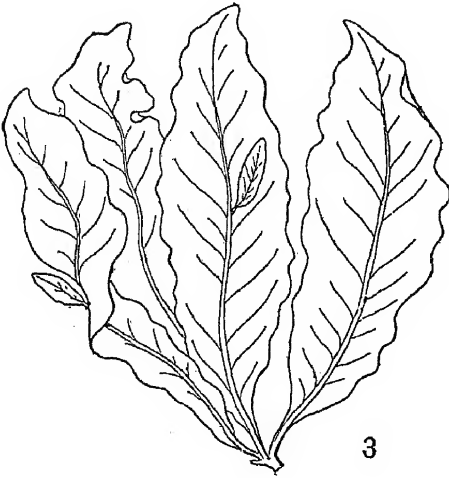
HYDROPHYTES



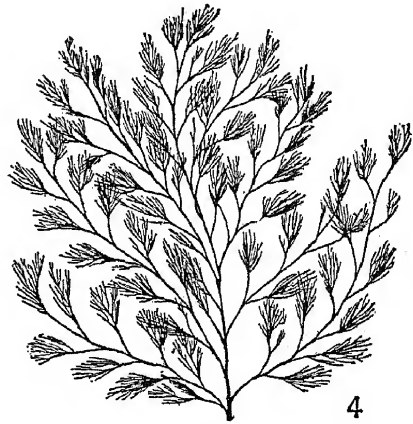
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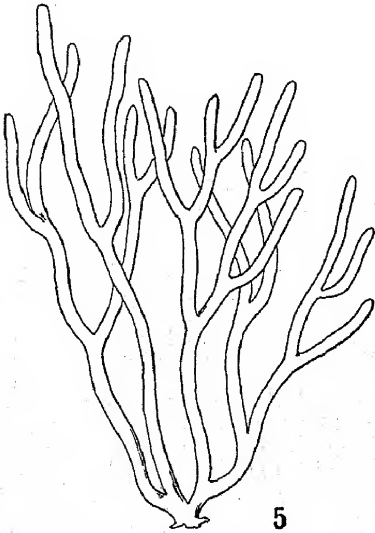
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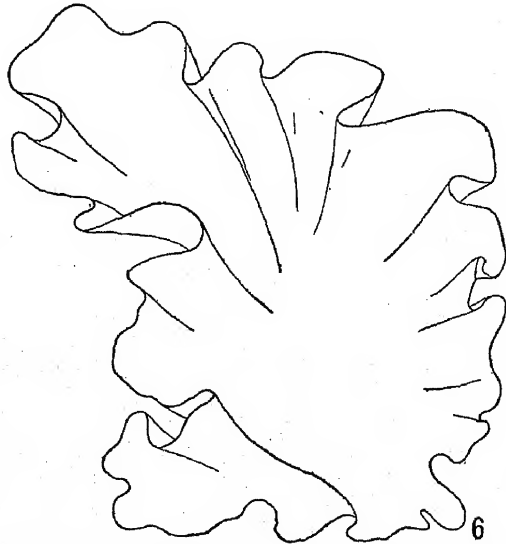
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5



6

RED ALGÆ

- 1. *Ptilota californica*
- 2. *Scinaia furcellata*
- 3. *Delesseria sanguinea*

- 4. *Polysiphonia Brodiaei*
- 5. *Nemalion multifidum*
- 6. *Porphyra laciniata*

the chief reason for the wide distribution of hydrophytic species is the great ease of dispersal by means of the water itself, but a reason, almost if not quite as important, is furnished by the wide degree of uniformity of hydrophytic conditions. Since water is colder in summer and warmer in winter than adjoining portions of the land, it is obvious that water plants can, for reasons of temperature, have a much wider distribution than land plants.

The hydrophytic plant societies may be roughly subdivided into those associated with salt water and those with fresh water. The former are treated under the heads PLANKTON, BENTHOS, MANGROVE SWAMP, and HALOPHYTE, the latter under the head of SWAMP, where it will be convenient, not only to treat the swamps proper, but also to some extent the development of the swamps from ponds and lakes. See AERATION, DISTRIBUTION OF PLANTS.

HYDROPLANE See MOTOR BOATING

HYDROSPHERE See GEOGRAPHY

HYDROSTATIC PRESS See HYDRAULIC PRESS

HYDROSTATICS (from Gk *ὑδρ-, hydr-,* water + *στατός, statos,* causing to stand, from *σταίω, histanai,* to stand). That branch of mechanics which treats of the properties of liquids in equilibrium and of solids either totally or in part immersed in liquids. Many of the laws and phenomena of hydrostatics apply equally well to both liquids and gases, i.e., to fluids. A fluid may be defined to be such a form of matter that it yields to any force, however small, which acts to make one layer of the substance move over another, thus, the shape of a liquid or gas depends entirely on the forces acting on it, however small, and not on the body itself, as in the case of a solid. A portion of liquid left to itself—as a falling drop—assumes a spherical shape owing to the contraction of the surface layer. (See CAPILLARITY). Under the action of gravity a liquid contained in an open vessel takes the shape of the vessel so far as all the surface is concerned, except that portion in contact with the air and the portions near the edges of this “free surface.” This surface is horizontal, being perpendicular to the vertical force of gravity if the liquid is at rest, because, if it were inclined to this, there would be a component of gravity tending to make the higher portion of the liquid slide down. When a fluid is said to be at rest, it is not implied that there is no motion of the molecules, but simply that there is no *flowing*, i.e., no currents, no wind. In the case of the open vessel there is a force pressing down on the free surface due to the weight of the atmosphere, and, since the liquid presses against the solid walls, they have a force of reaction against the liquid, thus, it is exactly as if the liquid were contained in a vessel and a tight-fitting piston were pressing down on its top surface. If a gas is contained in a balloon or in a room, it expands and is uniformly distributed throughout the space open to it, it presses against the containing walls, and they have an equal reaction on the gas. If a small quantity of a certain liquid is poured into a tall cylindrical vessel, then another liquid with which the first does not mix is poured carefully on top of this, etc. the equilibrium—if there is any—will be stable only if the density of any one liquid is less than that of the liquid below it and greater than that of the one above it. For, if the density of any layer is greater than that of

the one below it, the potential energy of the two will be decreased if the heavier liquid gets to the bottom and so comes closer to the earth.

Fluid Pressure As a result of the reaction of the containing walls on a liquid or a gas, there is always a “pressure” at each point throughout the fluid, i.e., there is a force acting over any surface immersed in the fluid, the numerical value of the pressure over any area is by definition the force per square centimeter, and the “pressure at a point” is the limiting value of the force acting on any surface at that point divided by the area of the surface, as the area is supposed to be taken smaller and smaller until it becomes practically a point. This pressure due to the reaction of the walls is the same for all points in the fluid. There is also an additional pressure at each point of a fluid on the surface of the earth owing to the fact that any horizontal plane passing through that point has to support the *weight* of the column of fluid vertically above it. If the area of this plane is A , the vertical height above it to the top of the fluid, h , the average density of the fluid, ρ , the acceleration due to gravity of a falling body g , the upward force will be ρghA , and therefore the pressure is ρgh . These two pressures are the only ones which affect our senses or produce mechanical effects in general, but there is also, of course, at any point in a liquid what may be called “cohesion,” or pressure due to the action of the molecules on each other. Some idea of the magnitude of this may be obtained by separating the molecules, e.g., by boiling the liquid. It is greatly affected by dissolving substances in the liquid. The pressure against any surface immersed in a fluid at rest is always at right angles to it, otherwise there would be produced a *flowing* owing to the component of the pressure along the surface. Further, the pressure at any point in a fluid at rest is the same in all directions, because, if it were greater in one direction than in another, the fluid would flow. Therefore the pressure at any point in a fluid at rest is the sum of the pressure due to the reaction of the walls, P , and that due to gravity, ρgh . As noted above, the former is the same for all points in the fluid. As a consequence, if a fluid is inclosed in a cylinder into which fit two pistons of different areas, A_1 and A_2 , the forces which must be applied to these pistons from without to prevent the fluid from pressing them outward are PA_1 and PA_2 , omitting any action of gravity. Therefore, if A_1 is small compared with A_2 , the force on the former piston is small compared with the balancing force on the latter, so a small force may produce a large one. In a liquid which is almost incompressible, P may be very great, and so the force produced may be enormous, but in a gas, which is easily compressed, P is never very large, and so the force produced is small. This principle is that of the hydrostatic press. See HYDRAULIC PRESS.

The total pressure, i.e., $P + \rho gh$, at all points in the same horizontal level in any one fluid, regardless of the shape or size of the containing vessel, is the same, for imagine a vessel with a horizontal bottom, all points of the fluid along this must have the same pressure, otherwise the fluid would flow, the pressure at any point at a level h centimeters above this bottom plane is less than that at the bottom by an amount ρgh —the same for all points in the plane. If, now, portions of the vessel are imagined removed so as to leave a vessel of any shape, the pressure at

the various points remains unaffected. The pressure on any portion of the containing walls varies with the depth, so the thrust outward on this portion is the resultant of a series of parallel forces, increasing from top to bottom, the point of application of this resultant is called the "centre of pressure" (q_v). If the wall is a vertical rectangle, the centre of the pressure, due to gravity, for a liquid, is at a distance one-third the height from the bottom, etc.

Archimedes' Principle. If a solid is completely immersed in a fluid, the latter exerts on it pressures from all directions perpendicular to the elementary portions of the surface of the solid. These pressures will produce an upward force on the solid equal to the weight of the fluid displaced by it, because, if the space occupied by the solid were to be filled with the fluid, there would be equilibrium, and, as this substitution has not changed the pressures at the boundary surface of the volume formerly occupied by the solid, the resultant of these surface pressures must just balance the weight downward of the fluid. This buoyant force acting on the solid must then equal the weight of the fluid displaced by the solid and must have a vertical line of action passing through the centre of gravity of the displaced fluid. This is called "Archimedes' principle." The apparent loss in weight of a body immersed in water, the suspension of a balloon, etc., are illustrations of it. It evidently gives a method for comparing the density of a solid with that of a liquid, for the weight of a solid in a vacuum is $\rho g v$, if ρ is the density of the solid and v its volume, and its apparent loss in weight when weighed suspended in the liquid is $\rho' g v$, if ρ' is the density of the liquid, both the weight and the loss in weight may be measured, and thus the ratio of ρ and ρ' determined.

Free Surface Waves. Liquids differ from gases in having definite volumes, consequently, as noted before, if a liquid is poured into an open vessel, it will have a surface in contact with the atmosphere. This is called the "free surface." If the liquid is in equilibrium, this surface must be at right angles to the forces acting on it. Thus, a liquid at rest in an open vessel has a horizontal surface owing to the earth's force of gravity. If this surface is disturbed, e.g., by dropping in a stone, the displaced portion will return to its previous level owing to the action of gravity, but its inertia will cause it to continue its motion, making a displacement in the opposite direction, then it will return, etc., thus vibrating up and down and producing waves out over the surface. These gravitational surface waves on a liquid advance with a velocity which depends upon the depth of the liquid and the wave length of the waves. Thus, if the liquid is shallow compared with the wave length, the velocity is given by the formula $v = \sqrt{hg}$, where h is the depth of the liquid and g is the acceleration of a falling body. If the liquid is deep compared with the wave length, the velocity of the waves is

$$v = \sqrt{\frac{g\lambda}{2\pi}},$$

where λ is the wave length of any train of waves and $\pi = 3.1416$. If the waves are extremely short—i.e., ripples—their motion is not due to gravitation, but to capillarity (q_v), because the surface is increased in area by the

ripples, and the capillary forces are in this case large compared with the gravitation ones, the surface being so slightly elevated or depressed. The velocity of these capillary waves is

$$v = \sqrt{\frac{2\pi T}{\lambda \rho}},$$

where T is the "surface tension" of the liquid. (See CAPILLARITY.) If the vessel containing the liquid is cylindrical, and if this is set rotating rapidly about its axis, the free surface will no longer be horizontal, because now the surface is acted upon by both gravity and "centrifugal force." The shape of the surface will be such as to be at right angles to their resultant, and will actually be a paraboloid of revolution.

If a liquid is poured into a vessel which consists of several parts, the liquid will stand at the same height in all parts provided they are wide and open to the atmosphere, for, as has been proved, all points at the same horizontal level in a fluid are at the same pressure, and conversely, and the points in the free surfaces are at the same pressure, viz., that of the atmosphere. If, however, a liquid is poured into a U-tube which stands erect, and then a lighter fluid, which does not mix with the first, is poured into one arm, the level of the surfaces of the liquids in the two arms is not the same. The pressure at points which lie in the horizontal plane passing through the surface of separation of the two liquids must be the same, because they are all connected by one liquid. The pressure at the points in one arm in this level is $\rho_1 g h_1 + P$, where ρ_1 is the density of the liquid in that arm, h_1 is the vertical height of its free surface above the level plane, and P is the pressure of the atmosphere on the free surface, similarly the pressure at this level in the other arm is $\rho_2 g h_2 + P$, where ρ_2 is the density of the liquid whose vertical height from the level to the free surface is h_2 . Therefore

$$\rho_1 g h_1 + P = \rho_2 g h_2 + P,$$

or

$$\rho_1 h_1 = \rho_2 h_2$$

Thus principle evidently furnishes a method for the comparison of the densities of two liquids which do not mix.

Flotation. If a body less dense than a liquid is immersed in the liquid and allowed to come to equilibrium, it will rise to the surface and "float" with only part of its volume below the surface. By Archimedes' principle the upward force equals the weight of the liquid displaced, and, since the body does not move in a vertical direction, this force must equal the weight of the body itself. Therefore a floating body displaces a volume of the liquid of weight equal to its own. The upward force acts through the centre of gravity of the space formerly occupied by the liquid displaced, while the downward force acts through the centre of gravity of the floating body. If the body is in equilibrium, these two forces must have the same line of action, i.e., the two centres of gravity must lie in the same vertical line. In most cases this equilibrium is stable, but it may be unstable, e.g., an oblong block set floating with its long direction vertical. The test of stability is to give the floating body a small displacement, i.e., tip it slightly, and to see if the forces acting on it tend to restore it to its previous position or to make it tip still further. See METACENTRE.

Capillarity. Where the free surface of the

liquid meets the wall it is not horizontal, and when a tube of fine bore dips into a liquid the free surface inside the tube is at a different level from that outside. These variations are said to be due to capillary action, and they may all be shown to be due to the fact that a liquid surface contacts so as to have the smallest area compatible with existing conditions. See CAPILLARITY.

The principle of Archimedes, discussed above, is attributed correctly to the philosopher of Syracuse, and many facts in regard to liquids were known to him and other scientists of antiquity. Galileo first stated the law of connecting tubes, and Pascal was the first to recognize the fact that the reaction of the walls produced a pressure which was the same at all points throughout the fluid. The ordinary statements and proofs of hydrostatics are given to-day exactly as they were by Stevinus (1548-1620). For further information, consult Greenhill, *Hydrostatics* (London, 1894), S. L. Loney, *Elements of Hydrostatics* (2d ed., New York, 1900), E. S. Gould, *Practical Hydrostatics and Hydrostatic Formulas* (ib., 1903), G. M. Minchin, *Treatise on Hydrostatics* (2d ed., Oxford, 1912).

HYDROSULPHURIC ACID. See SULPHURETED HYDROGEN.

HYDROTHERAPY (from Gk *ὕδωρ*, *hydōr*, water + *θεραπεία*, *therapeia*, cure, from *θεραπεύω*, *therapeuō*, to cure, from *θεράπων*, *therapōn*, attendant). The use of water as a remedial agent. The efficacy of water in the cure of numerous forms of disease has long been recognized. Water was largely employed by Hippocrates in the treatment of many kinds of disease. Horace speaks of Antonius Musa, the hydropathic physician of the Emperor Augustus (*Epist.*, i, 15). Both Celsus and Galen speak favorably in their writings of the use of water in the cure of disease, regarding it as of high value in the treatment of acute complaints, particularly of fevers. Throughout the Middle Ages, likewise, many physicians, including Aetius, Paulus Aegineta, and Paracelsus, were advocates of the remedial virtues of water, all of them, however, having faith in its uses in the treatment rather of acute than of chronic disorders. In 1723 Niccolò Lanzi, a Neapolitan physician, published a learned treatise on the subject. In England, about the beginning of the eighteenth century, Sir John Floyer and Dr. Baynard made large use of water. Their conjoint work, denominated *Psychiculousia*, or the "History of Cold Bathing, both Ancient and Modern," is replete with quaint learning and practical shrewdness and sagacity. But the most able and scientific among the older treatises that have appeared in England on the subject of the water treatment is the work of Dr. Currie, published in 1797, entitled *Medical Reports on the Effects of Water, Cold and Warm, etc.* In this work Currie recommends the cold affusion in typhus and other fevers and gives practical directions in regard to the cases and the times when it may be used with advantage, although he appears to have limited his use of water to acute ailments exclusively.

We have thus seen that up to the beginning of the nineteenth century, by some of those who employed it as a curative agent, water was used in the treatment of acute, and by others of chronic, diseases, by some as an internal agent alone, by others as an external application in the various forms of the bath, but never in all the manners combined. This combination was

first effected by the original genius of Vincent Priessnitz, a Silesian farmer, with whom began a new era for the water cure. It was owing, we are told, to his successful treatment of more than one bodily injury which he had sustained in his own person that, about the year 1820, Priessnitz became so convinced of the curative powers of water as to employ it medically in the cure of others. Beginning with the external application of water for trifling diseases among the poor of his neighborhood, he gradually undertook an extended range of cases and multiplied the modes of administration, introducing the wet compress, the douche bath, partial baths of all kinds, the sweating process, the wet sheet, together with copious drinking of pure water. In addition to water in all these forms, he insisted on the value of exercise, diet, fresh air, and mental repose in the cure of disease, thus practically calling to his aid the entire resources of hygiene, and establishing, by a simple yet thoroughly original combination, nothing less than a new system of medical treatment. As to the success which attended Priessnitz's practice, it is an historical fact that of 7500 patients who had gone to Grafenberg for advice and treatment up to the year 1841, or within the space of about 20 years, there had been only 39 deaths. It is to be regretted, however, that the founder of the new system was not an educated physician, so that he could have understood better the philosophy of his own practice and explained it more correctly. He would not have called his system the "water cure," a name scientifically one-sided and incomplete and therefore misleading.

The undoubted merits of hydrotherapy at length called to its defense many men of standing in the profession, who, allowing for some of its early extravagances, explained it scientifically, and from their advocacy has sprung up a school of hydropathic physicians. Dr. Winternitz, of Germany, in 1883 laid down the scientific principles of modern hydrotherapy. The fundamental principles of hydrotherapy are very simple. The art of applying these principles requires much teaching, but any one with even moderate sense and intellect can grasp the essential features. Water may be used either internally or externally. Internally it may be used simply to wash out a cavity—the nose, the mouth, the stomach, the bladder, or the rectum. In addition, it may be taken internally hot or cold and passed into the blood. It may be used hot in the rectum, as a simple enema, or for purposes of stimulation. Externally water may be used in many conceivable ways, but essentially the use of water means with it the use of two very necessary aids, heat and cold. Hydrotherapy, apart from the use of heat and cold, is of secondary importance. The action of water in the treatment of disease is therefore largely mechanical. The psychical side is not unimportant. It has been used by enlightened physicians ever since the dawn of medicine, and its effects taught in all medical schools. Only the quack and the charlatan will claim that hydrotherapy is a cure-all. Eccentricities, like the Kneipp cure and others, are to be avoided by the sensible. Water acts physically and mechanically. It is capable of readily taking up heat and of giving it up, it thus lends itself most readily to the use of thermal agents. It may be used in gaseous form (steam), liquid form, or solid form (ice). The action of heat and cold is essentially important. Smooth muscle fibre expands under the action of

moderate heat and contracts under the influence of cold. Its contracting power may be destroyed by an excess of either. Cold and heat therefore act as irritants to the nervous system, and through their agency we can act upon all of the organs, to stimulate or depress their activities. The heart, lungs, kidneys, liver, spleen, skin, etc., may all be influenced, the body heat and the output of moisture and secretions may be regulated. Thus, by the use of heat or cold to certain portions of the skin or internally, almost every organ in the body can be influenced through its blood vessels, and the skilled physician can, by guiding and directing these effects, bring about changes in vascular states, can remove excess of blood from one part of the body and bring it to another, can impart tone to a flagging organ, as the heart, or to the muscles or to the spinal cord, can increase the secretions from organs, such as the skin or the kidneys, and thus assist in excreting poisonous products from the body.

Chief among the eminent exponents of hydrotherapy in Europe are Kisch, professor in the University of Prague, Strasser and Buxbaum of Vienna—the former of the University of Vienna, the latter chief of the Hydrotherapeutic Institute. In the United States, besides Baruch of New York, Eshner of Philadelphia, Hinsdale of Hot Springs, Va., and Kellogg of Battle Creek, Mich., are well known.

The applications of water to disease are well systematized by Baruch as *ablution*, *affusion*, *sheet bath*, *drip sheet*, *compresses*, *wet pack*, *tub bath*, and *douche*.

Ablution. Simple application of water by the hand or moist cloth over the body. In fevers the abdomen, the back, the chest, the lower extremities as far as the knees, are bathed successively every two or three hours. A temperature of 75° F. should be used at first and gradually reduced to 60° F. Chilling is to be avoided. Reaction is to be gained, the superficial capillaries becoming suffused and the body assuming a pinkish hue. Rubbing should always be used in ablutions.

Affusion. The patient, with a cold wet cloth about the head, sits or stands in a tub containing about a foot of water at 100° F. A broad stream of water from a bucket or pitcher is poured with force directly over the body. The stimulation will depend upon the temperature of the water and its force of delivery. This is often used in states of profound prostration, in coma, and in stuporous, delirious states.

Sheet Bath. A rubber sheet is laid down over one half of the bed. This is covered by a blanket. Then a linen sheet is dipped in water at a temperature of from 60° to 70° F., and while still wet is wrapped about the patient while he lies upon the blanket. The face is bathed in ice water and the head covered with a wet towel. The nurse or attendant rubs the patient energetically over the body. As the body reacts and becomes warm, water at still lower temperatures may be sprayed over the sheet. Afterward the patient may be wrapped up in the blanket. This is an excellent method for reducing temperature in fevers and is applicable in practically all acute diseases accompanied by high temperature.

Drip Sheet. The patient, standing in a tub of water at 100° F., has a wet sheet, wrung out, wrapped about him. He is then firmly rubbed until a reaction occurs. He may be slapped gently instead of being rubbed. This procedure forms an excellent tonic in nervous exhaustion, in the

early stages of tuberculosis, and in chlorosis or anemia.

Compresses. These consist of bands or squares of old linen to which flannel is attached and stings made to fasten the appliance about a part. The linen piece is usually wrung out of hot or cold water and applied to the part and wrapped about by the flannel to prevent evaporation. These compresses are valuable in sore throat, tonsillitis, rheumatism, pneumonia, sprains, etc. They should be renewed hourly in acute processes.

Wet Pack. This is similar to the sheet bath, save that the sheet covering the body is wrung dry and then the patient is rolled up completely in thick blankets. The air should be kept out by fixing the blanket very securely about the feet and neck. The wet pack is more useful in chronic cases. Friction is essential in the acute cases, in order to bring about quicker reaction, hence in these the sheet bath is usually preferred to the wet pack.

Tub Bath. A trained nurse should give this bath. See TYPHOID FEVER.

Hammock Bath, or Continuous Bath. This is a device by which the patient is suspended for periods of time, varying from hours to months, in a bathtub filled with water at a temperature from 95° to 100° F. The procedure is applicable to cases of cerebral excitement, acute mania, delirium tremens and chronic organic diseases of the central nervous system, as well as extensive burns and suppurating wounds. Dr. A. Rose, of New York, has advocated the continuous bath for the treatment of tuberculosis, both of the lungs and bones.

Neuro-vascular Training (Baruch). This consists of the hot-air-cabinet treatment, employed till the skin is relaxed and perspiration is free, being followed by a douching of the body at 95° F., 20 pounds' pressure for one minute. On each successive day the temperature is lowered two or three degrees till 70° F. is reached, after several days.

Douche. This apparatus throws a jet of water against the body from a hose and is best given in a special institution devised for this work. Arrangement is made in the apparatus whereby the force of the jet and its temperature can be regulated.

Marienbad, Franzensbad, Ems, Kissingen, Homburg, Bruckenaue, Aix-les-Bains, Vichy, Harrogate, Bath, and many other European spas present varying water treatments. In this country Mount Clemens, Battle Creek, Hot Springs, Ark., Hot Springs, Va., Colorado Springs, Saratoga Springs, and several other towns provide balneologic possibilities. One of the best known of the hydrotherapeutic procedures is the "Nauheim bath," elaborated by Beneke and the late August Scholt at the German town which bears its name, and administered to many thousands annually. The water used contains in solution various salts and carbonic-oxide gas. The "Nauheim system" consists of a series of graduated baths of decreasing temperatures, besides exact diet, exercise, and rest. In Nauheim salts and gas are added to the later series of baths. Incipient arteriosclerosis, certain kidney disorders, rheumatism, lumbago, neuritis, arthritis, neurasthenia, exhaustion, and especially certain heart disorders are treated with success in very many instances by this system of baths. In Saratoga Springs, N. Y., the natural mineral waters contain a larger gas content than any

others east of the Rocky Mountains, and Saratoga is the only locality in the United States where the Nauheim baths are given with natural radioactive saline water without admixture of gas, under the control of the government of New York State, through a special reservation commission. See SARATOGA SPRINGS.

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HYDROTHORAX (Neo-Lat., from Gk *ὑδωρ*, *hydōr*, water + *θώραξ*, *thōrax*, chest) The term applied to dropsical collections in the pleura (qv), a closed serous sac enveloping the lung on either side. When it exists to any extent, the pressure which it exerts on the lungs impedes the passage of the blood through them, occasions difficulty of breathing, and lividity of countenance soon appears. The physical signs by which the disease can be detected by the physician are changes in the condition of the chest, as ascertained by auscultation, percussion, and auscultation.

Hydrothorax may depend upon inflammation of the secreting membrane, or it may be a consequence of organic disease of the heart or lungs, liver, or kidneys. With regard to treatment, when the disease seems to depend upon inflammation of the pleura, great advantage may often be derived from occasional cupping and repeated blistering, hydragogue catharsis, and withdrawing the fluid from the chest (tapping) by means of a hollow needle.

HYDROTROPISM (from Gk *ὑδωρ*, *hydōr*, water + *τροπή*, *trōpē*, a turning, from *τρέπω*, *trēpō*, to turn) The sensitiveness of certain plant organs to the presence of unequally distributed water vapor, which causes them to turn towards or away from the region of greater

rise at right angles to it. If they start from a salient angle on the substratum (e.g., the edge of a slice of bread), they may take the position shown at Fig. 1, growing equidistant from the two moist surfaces. If they arise from a re-entrant angle, they place themselves likewise so

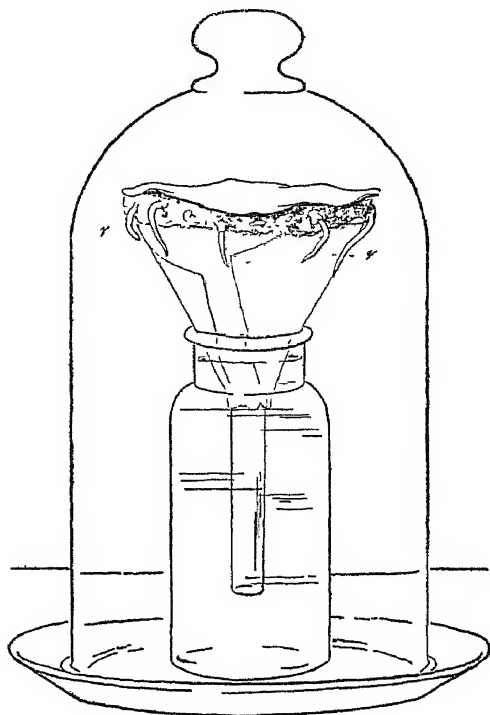


FIG. 2 POSITIVE HYDROTROPISM

Grains of corn, planted in wet sand in a funnel whose outer surface is covered with wet blotting-paper, have germinated. The roots, *r*, instead of growing straight down, as they would do in saturated air, have applied themselves to the wet paper. Hydrotropism under these conditions overpowers geotropism.

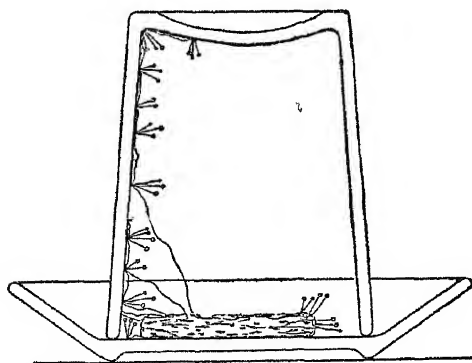


FIG. 1 NEGATIVE HYDROTROPISM

Culture of the black mold on bread in a moist chamber. The hyphae carrying the beadlike sporangia grown in such directions as to be as far as possible from the surfaces of bread and glass from which moisture is diffusing. Diagrammatic.

density. Among the fungi hydrotropism is shown particularly by those filaments (hyphae) which bear the sporangia. While most of the hyphae ramify through the moist substance on which the fungus grows, the sporangial hyphae

as to be as far away from each moist surface as possible. The roots of higher plants are also sensitive to moisture, the stimulus of which may exceed that of gravity, as shown in Fig. 2. Here roots of corn planted in the heaped-up sand have come over the edge of the glass funnel and have started to grow downward in the moist air. As they get farther from the surface of the wet paper covering the outside of the funnel they find drier and drier air. A stream of water particles, however, is reaching them from one side. At a certain point the stimulus of the diffusing moisture overcomes the geotropism (qv), and the root, growing more rapidly on one side, is directed towards the moist surface. When it comes into the neighborhood of the moist paper again, the sides are less unequally stimulated, the stimulus of gravity reasserts itself, and the tip again grows downward. The alternating prevalence of hydrotropism and geotropism is shown in the wavy course of the longer roots. It will be observed that the more rapid growth which directs the tip towards the moist surface is not due merely to the absorption of water, for it occurs on the drier side of the root. It is an induced process involving growth. Hydrotropism is a form of chemotropism (qv).

For hydrotropism in animals, see TROPISM.

HYDROZOA (Neo-Lat nom pl, from Gk *ὕδωρ*, *hydōr*, water + *ζῷον*, *zōon*, animal) A class of *Cœlenterata* in which the simplest form of the body, as in the polyps, is a sac attached by its posterior end, and with a digestive cavity communicating with the exterior by a mouth only. The mouth is surmounted by hollow tentacles. The body is composed of two cellular layers, the ectoderm and endoderm, separated by a gelatinous, noncellular "mesoglea". The body is usually differentiated into two sorts of zooids, i.e., "polyps," or nutritive zooids, which are usually sexless, and "medusæ," or reproductive zooids. The latter produce medusæ buds, which on being set free are called medusæ and are bisexual. In these medusæ the body is greatly more complicated than in the polyps, being bell or umbrella shaped, with a well-developed nervous system, composed of a thread running around the eye of the disk and with ganglia near the "eyes," or sense organs. The digestive cavity is differentiated into a central and a peripheral portion, the latter forming radial and circular canals. The eggs and sperm are discharged externally, and fertilization of the egg takes place in the sea. Netting organs (see *NEMATOCYST*) are usually present; they arise from some of the interstitial cells and are most abundant in the tentacles. Many Hydrozoa (*Hydra* excepted) exhibit the phenomenon of alternation of generations (q.v.). The asexual polyps give rise to buds which develop into medusæ, and the latter lay the eggs from which are hatched the polyps. The medusæ are more or less phosphorescent. They abound in all seas, while *Hydra* is a minute fresh-water form. Very primitive fresh-water forms are *Protohydra* and *Microhydra*, which are without tentacles.

The Hydrozoa are grouped in five orders: (1) Leptothecæ, having a fixed zoophyte or polyp stage, and the sense organs exclusively ectodermal (Anthomedusæ and Leptomedusæ), (2) Trachylinæ, having no fixed zoophyte stage, all being locomotive medusæ (Trachymedusæ and Narcomedusæ), (3) Hydrocorallina, coral-making polyps (*Millepora* and *Stylaster*), (4) Siphonophora, pelagic hydroids in polymorphic colonies, (5) *Graptolithoidea*, which are an extinct Paleozoic group.

The term *Hydromedusa* is often used as synonymous with orders one and two above. In some species only the free living, in others only the fixed, stage occurs. In the majority there is an alternation of the one stage with the other in the life history. The Scyphomedusæ are larger and more complicated in their structure than the Hydromedusæ and belong in class Scyphozoa.

Of the orders above mentioned, the Hydrocorallina and *Graptolithoidea* are of importance to the geologist, for they contain fossils of considerable interest. See *STROMATOPORA*, *GRAPTOLITE*.

Consult T. H. Huxley, *Oceanic Hydrozoa* (London, 1859), Parker and Haswell, *Text-Book of Zoology* (New York, 1897); Fowler, "The Hydromedusæ and the Scyphomedusæ," in Lankester's *Treatise on Zoology*, part ii (London, 1900), S. J. Huxson, "Cœlenterata and Ctenophora," in *Cambridge Natural History*, vol. 1 (ib, 1906). See *CORAL*, *CTENOPHORA*, *HYDRA*, *HYDROID*, *JELLYFISH*, *MEDUSA*, *POLYP*, *SIPHONOPHORA*, ETC.

HYENA, hi-ē'na (Lat *hyæna*, from Gk *ἡἡνα*, *hyæna*, hyena, from *ἡς*, *hys*, hog, Lat *sus*, AS., OHG *sū*, Ger *Sau*, Eng *sow*, Av *hu*, pig, connected either with Skt *sū*, to bear, or with Skt

sākhya, swine, *sū*, make), so called from the grunt). One of a family (*Hyænidæ*) of carnivorous animals remarkable for their generalized structure, which unites features characteristic of the cats, the civets, and the dogs. Their den-



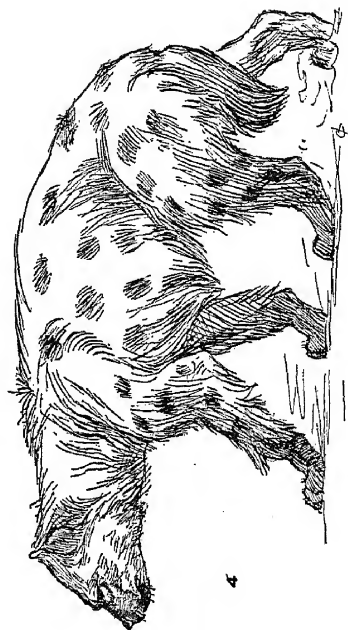
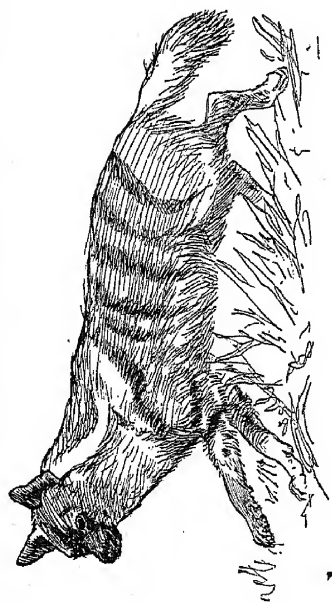
DENTITION OF HYENA

i, incisors, c, canine, p, premolars, m, molars

tation is calculated for great tearing and crushing power and includes six incisors and two canine teeth in each jaw, five molars on each side of the upper jaw, and four in the under. This dentition and other features place them between the dogs and the civets, with the latter of which they are connected by *Proteles*. (See *AARD-WOLF*.) They seize an object with so firm a hold that among Arabs they are proverbial for obstinacy. The vertebrae of the neck sometimes become ankylosed in old hyenas. In size they equal the largest dogs. The hind quarters are lower and weaker than the fore quarters of the body, so that hyenas move with a shambling gait. The body is covered with long coarse hair, forming a mane along the neck and back. The feet have each four toes. The claws are strong, fit for digging, and not retractile. The tail is short. Beneath the anus is a deep glandular pouch, contributing much to the offensive odor which is one of their many disagreeable characteristics. Hyenas eat carrion as well as newly killed prey and are of much use, like vultures, as scavengers, clearing away the last remnants of carcasses. They sometimes attack cattle, especially if they flee, but rarely man, though they sometimes seize children. Selous gives surprising instances of their boldness and strength in East Africa. During the day they hide themselves in caves, old rock tombs, and ruined edifices, by night they roam singly or in packs. They prow about towns and villages, and often dig up corpses that have not been deeply buried. This habit, together with their aspect, has caused them to be generally regarded with horror, and very exaggerated accounts of their fierceness have been prevalent. Instead of being untamable, as was long the popular belief, they are capable of being completely tamed and show an attachment to man similar to that of the dog, they have even been used as watchdogs. Hyenas are found only in Africa and in south Asia.

The most typical and at the same time familiar form is the striped hyena (*Hyæna hyæna*, or *striata*), which ranges from Abyssinia and the Libyan Desert eastward to India, where it is common throughout all the more open country, roaming widely at night in search of carrion or living sheep and dogs. It is dirty gray, with narrow tawny or zebra-like stripes, a coarse mane along the back, and a bushy tail. It is cowardly, silent, and both hated and feared by the rural people. Two other species are exclusively African and differ much from the striped, so that some naturalists put them in another genus (*Crocuta*). The spotted hyena (*Hyæna*, or *Orocuta*, *crocuta*) is larger than either the striped or the brown and is yellowish, thickly spotted with black, with nose and feet dark. It inhabits nearly all Africa south of the Sahara, hunts in packs, is courageous, and really does

HYENAS AND PROTELES



1. AARD-WOLF (*Proteles laurii*).
2. STRIPED HYENA (*Hyæna hyæna*).

3. BROWN HYENA (*Hyæna brunnea*).
4. SPOTTED HYENA (*Crocuta crocuta*).

most of the ravaging it is accused of. Its unearthly coughing cry is one of the most terrifying of animal utterances. Owing to the peculiar arrangement of the reproductive organs in this species, it is extremely difficult, except by careful examination, to distinguish the sexes by external characters, and from this fact the old myth that hyenas are hermaphrodites has doubtless arisen.

Median in size stands the brown hyena (*Hyena brunnea*), found on both sides of southern Africa near the coast and often on the mountains. It is a less repulsive-looking animal than the others, has a doglike mantle of long brown hair which half conceals its barred legs, and becomes white on the sides of the head and chest, giving a quaint appearance to the front view, since the face itself is black, while the tall ears are gray.

The hyena family, of comparatively recent origin, appears to have evolved from the Viverridae, through such an intermediate genus as *Ictitherium* of the Lower Pliocene of southern Europe. That *Ictitherium* ate bones in the same manner as do the modern hyenas has been proved by the nature of the coprolites found associated with their skeletons. True hyenas are common fossils in the Pliocene and Pleistocene deposits of Europe, during which periods they roamed in abundance as far north as France and England, as is exhibited by their remains in cave floors, and they are known in deposits of similar age in Asia. None have been found in America.

Consult W. T. Blanford, *Geology and Zoology of Abyssinia* in 1867-68 (London, 1870), id., *Fauna of British India Mammals* (ib., 1888-91), Richard Lydekker, *The Game Animals of Africa* (ib., 1908), Roosevelt and Heller, *Life-Histories of African Game Animals* (New York, 1914), and the writings of sportsmen travelers in Africa and India. See PLATE of HYENAS.

HYENA DOG See HUNTING DOG.

HYÈRES, e'ar'. A town in the Department of Var, France, 3 miles from the Mediterranean and 8 miles east of Toulon (Map France, S, L 5). It is a fashionable winter resort, picturesquely situated on the south slope of a castle-crowned hill 670 feet high, in a district noted for its mild climate and luxuriant vegetation. Its chief buildings are the restored twelfth-century cathedral church of St. Louis, the hôtel de ville, public library, theatre, zoological garden, and museum. There is a considerable export trade in flowers, fruits, cork, and salt. The extensive salt marshes in the vicinity employ 300 people and yield more than 40,000 tons annually. In mediæval times, as Hiedera, Hyères was a favored port of call for Oriental pilgrims and as late as the fourteenth century was of greater importance than Toulon. Pop., 1901, 17,659, 1911, 21,339.

HYGEIA, hi-gē'ya, or **HYGIEIA**, hi-gi-ē'ya (Lat. from Gk. *Ἥγεια*, *Hygeia*, *Ἰγία*, *Hygieia*, health, from *ὑγιής*, *hygiēs*, healthful). In the ordinary Greek tradition, which does not antedate the fifth century B.C., the goddess of health, daughter of Asclepius (see **ÆSCULAPIUS**), and honored with him at Athens, Epidaurus (after 420 B.C.), Sicily, Corinth, Titane (in the territory of Sicily), and elsewhere. She was joined with the god of healing, Amphiaraus, at Oropus. On the Acropolis at Athens there was an ancient cult of Athena Hygeia, to whom a statue and altar were erected after the great plague (430 B.C.) and before the introduction of the

worship of Asclepius in Athens. In the art of the fifth and fourth centuries B.C. Hygeia is represented as a maiden, but of the fully developed and vigorous type, while later her form is more youthful and girlish. She is represented in company with her father, or sometimes alone, with the snake by her side or drinking from the patera in her hand. Hygeia seems to have been originally an abstraction, later converted into an independent divinity, who came into connection with various deities associated with the cure of disease. In 293 B.C. her cult was introduced into Rome along with that of *Æsculapius*, at Rome she was known also as *Vale tudo* (health) or *Salus* (safety). Consult the article "Hygiea," in Roscher *Lexikon der griechischen und römischen Mythologie*, vol. 1 (Leipzig, 1884-90).

HYGIENE, hi'ji-en (from F1 *hygiene*, from Gk. *ὑγιαίνω*, *hygiainein*, to be healthy, from *ὑγιής*, *hygiēs*, healthy). The branch of medical science which deals with the preservation of health. Within its scope are all measures taken for the acquisition and preservation of health, except those involving purely medical and surgical means. Hygienic measures were a part of religious observance among the Jews as well as among the people of Assyria and India, and their enforcement lay with the priests. Among the Greeks these duties were transferred to the physicians. Hippocrates' work on *Air, Water, and Places* was largely responsible for this change. (See **HIPPOCRATES**.) In the twenty-second book of Homer's *Odyssey* there is an account of the sanitary precautions taken by Ulysses after the killing of the wooers. The place of slaughter was cleansed and disinfected by scraping and washing and by burning sulphur. Little attention appears to have been paid to the infected individual in the plague time, when the panic ensuing upon a plague caused expulsion or expatriation of the sufferers. Laws were framed to protect the public from lepers, e.g., by expelling them and burning their houses. In 1423 Venice established its first lazaretto, and in 1485 a permanent health magistracy was created in that city. In 1532 an Act of Parliament authorized in England the issue of commissions of sewers for "the overlooking of sea banks and sea walls, and the cleansing of rivers, public streams, and ditches." In 1552 Shakespeare's father was fined for throwing filth into the street and again in 1558 for not keeping his gutter clean.

Roman law provided no protection for the individual. Greek and Latin writers treated of diet and exercise for the patrons of literature, for princes, and for the wealthy. From the school of Salernum, about the twelfth century, issued the *Code of Health*, which was printed in 1480 and for two centuries thereafter remained the standard work on personal hygiene. Despite the stringent laws seeking to prevent plague which were enacted by James I, and the establishment of lazarettos into which ships discharged their cargoes for detention and airing, serious outbreaks of the dread disease occurred in 1625 and 1629-31. In 1665, according to Macaulay's estimate, the number of deaths from plague during one period of six months reached more than 100,000.

At the close of the eighteenth century little advance had been made in hygienic knowledge beyond the discovery by Woodhall, in 1617, that scurvy was prevented by the use of lemon juice,

the discovery by Morton, in 1697, that foul air produced disease in some way, and the introduction from Turkey into England in 1717 of inoculation with smallpox virus by Lady Mary Wortley Montagu. Differentiation of fevers began early in the nineteenth century. Following the cholera epidemic in London of 1831-32, newly awakened interest resulted in the formation in 1838 of a system of registration of deaths in that city. The establishment of the fact of water-borne diseases was made by the investigations of Dr John Snow into the cholera outbreak in London in 1848-49. From this date investigation has been systematically pursued into the causes of death, the causes of disease, its spread, and the agencies that produce it, and into the conditions that promote health. The use of the microscope, the study of bacteriology, of pathology, of the chemistry of food, of climate, and of exercise, have all added to the knowledge that has increased the useful application of hygienic principles in our day. Sanitary laws have been enacted which control unhealthful agencies and aim to safeguard and regulate commercial as well as domestic relations.

Hygiene may be variously classified, according to its relations and the objects in view. There is the hygiene of the individual, of the family, and of the municipality or state, which may be denominated personal, domestic, and public hygiene.

Personal Hygiene. This includes the study of (1) *Food*, including water and beverages. Food should be adapted to the season of the year, the age, occupation, and the condition of health of the individual. An increase in the quantity of fruit and of water, a greater proportion of vegetables, and smaller meals are desirable in hot weather, while an increase in meat and in cereals is desirable in cold weather. Infants require principally milk, with the proportions of proteids, fats, and sugar graded according to age and digestive capacity. Older children require small quantities of meats, cereals, fruits, and vegetables. In regard to occupation, it may be said in general that active laboring men, like carpenters, blacksmiths, and farmers, may partake of food which takes a considerable time to digest, with more advantage than sedentary men may. Pork and corn cake or bread is a nutritious and sustaining diet to an active laborer, but should not form the habitual diet of a sedentary person. (See DIET, paragraph *Diet in Disease*, see also FOOD.) The investigation of water supply, examination for noxious ingredients or medicinal properties in drinking water, as well as directions for its use, come within the province of hygiene, as does also the use of coffee and tea, which are both stimulating drugs, causing in some persons overaction of the heart, cerebral activity resulting in insomnia, and indigestion, of cocoa, which is slightly stimulating, but contains food, of wine, beer, and distilled liquors, all of which are drugs in the eyes of the physician and the sanitarian, to be used with accurate calculation of their nutrient and stimulant properties. (See ALCOHOL, PHARMACOLOGY, TOXICOLOGY, AND THERAPEUTIC USE.) (2) *Clothing* should be suited to the temperature, age, and occupation. Ventilation as well as materials—wool, cotton, linen, and silk—must be considered. (3) *Work and Exercise* are necessary for every one. Regular physical activity is essential to proper development and to the maintenance of normal action of the vital organs and

the repair of tissue. Even those who are confined to bed by disease need exercise, which is secured by passive motion or massage. (See GYMNASTICS, EXERCISE, MASSAGE.) To work must be joined the consideration of rest and sleep, which should be enjoyed at regular intervals and in quantities proportioned to individual conditions and occupations. (See SLEEP.) (4) *Personal Cleanliness* includes regular evacuations of the bowels daily, daily bathing, securing constant removal of perspiration, care of the hair and scalp, and care of the nostrils, of the cavity of the mouth and teeth, of the genitals, and of the anal orifice. (5) *Special Habits* which tend to undermine health should be controlled, the use of tobacco, of other narcotics, and of stimulants should receive consideration. Tobacco should never be used before the age of 21 or 22 years has been reached and should rarely be used by neurasthenics. In certain diseases, as Bright's disease and syphilis, and certain conditions of the heart, tobacco is pernicious. All other narcotics are distinctly deleterious and should be forbidden. (6) *Control of Sexual and Other Passions* has much to do with personal health. Indulgence in masturbation by the young delays development and in many cases causes mental enfeeblement. Excessive sexual intercourse has a similar effect, with greater disaster to the male. Perhaps the most undermining of normal mental activities are anger and grief, and these should be avoided or limited. The thoughts should be calm, and mental exercise, as well as physical, should be regularly taken. Mental indolence leads more often to mental disorder than does mental overwork.

Domestic Hygiene. This includes the study of (1) *the Management of Infancy*, (2) *Preparation of Food*, with regulation of meals, as well as supervision of cooking, and (3) *the Hygiene of the Sick Room*, including removal of dust-catching furnishings, regulation of heat, light, and ventilation, provision of utensils which may be sterilized, care of bedding and bed linen and arrangements for proper bathing and nursing. Besides these subdivisions, others might be made which would duplicate some of the titles more properly assigned to personal or public hygiene, such as *air*, and *hygiene of the school*. The latter topic will be treated under SCHOOLS, MEDICAL INSPECTION OF.

Public Hygiene. This comprises care of the surroundings of man, as well as prevention of disease, and disposal of the dead, and therefore includes a consideration of (1) *Climate*, as one of the agencies active in man's environment, is used as an elastic term to embrace the range of temperature of a locality, the prevailing winds, the rainfall, the vegetation, and the soil. (2) *The Soil under Dwellings*, with reference to possibilities of drainage, proximity to underground water, etc. (3) *The Character of Dwellings*, especially tenements, as to ventilation, and air space, position, and materials used in construction, and provision for regulating temperature, water supply, and drainage. (4) *Cleaning of Dwellings and Disposal of Refuse*. (5) *Cleaning of Streets* in towns. One of the most important questions of public hygiene is the cleaning of streets, and matters connected therewith. Not only are filthy streets productive of disease by the generation of poisonous gases, but also the dust which results from the long-continued trituration of excrementitious and decaying substances is extremely injurious to the mucous

membrane of the air passages, and productive of contamination to blood and tissue. The habit of casting the sweepings of houses and stores upon the sidewalks, especially during the hours in which pedestrians are passing, is a greater evil than many suppose. The dust of these places is often of the most objectionable character, containing the germs of contagion, and there is no doubt that many "filth diseases" (qv) are propagated in this manner. (6) *Regulation of Public Conveyances*. Public conveyances are frequent causes of disease from various sources. The dust which is allowed to collect in street cars, and also ordinary steam-railway cars, is of itself a frequent cause of diseases of the air passages, but compared to the evils which result from overcrowding and bad ventilation, it is of minor importance. Pneumonia, pleurisy, bronchitis, and laryngitis are common results of street-car exposure. But one of their greatest evils, and one not yet sufficiently recognized by the public, although well known to the medical profession, is the want of attention paid to the smoothness of the track and the springs of the cars. On street cars undue jarring should not be permitted. When they are properly supplied with springs, and when wheels that are flattened are promptly replaced, all injurious vibrations will be avoided. (7) *Control of Air Spaces in Public Buildings*, such as hospitals, asylums, orphanages, lecture rooms, theatres, schoolhouses, etc. The vitiation of air due to impurities added to it by respiration is a subject of great moment. Following are figures showing the difference in the proportion of the constituents of the percentages of expired air and of ordinary air.

	Ordinary air	Expired air
Oxygen	20.96	16.40
Nitrogen	79.00	79.19
Carbon dioxide	0.04	4.41

From these figures it is seen that expired air contains over 100 times more carbon dioxide and nearly 5 per cent less oxygen than ordinary atmospheric air. Experiments have shown that the average adult emits with each expiration 22 cubic inches of air, or, assuming 18 respirations a minute, 570,240 cubic inches, or 330 cubic feet, of air in 24 hours. In this total of expired air there are 14.52 cubic feet of carbon dioxide. This amount is increased with increase of physical activity. The figures of De Chaumont, which are generally accepted, show that there is 0.6 part of carbon dioxide per 1000 in the air of a closed and occupied space, or 0.2 part in excess of that in ordinary atmosphere. Burning of coal or illuminating gas adds to the impurity, and hence ventilation is essential. In public buildings, such as those named, there should be 3 cubic feet of space per person in each room, after deducting from the total room space the amount occupied by furniture and the bodies of the persons. (8) *Prevention of Disease*. This is a very large topic, and necessarily bears close relation with personal as well as domestic hygiene. It includes notification of diseases to a health officer, most of the activities of municipal departments of health (see HEALTH, BOARDS OF, SCHOOLS, MEDICAL INSPECTION OF), control of streets and houses and disposal of refuse (see DISINFECTANTS), control of disease entering seaports (see QUARANTINE); prophylaxis of special kinds against spread of disease (see ANTITOXIN, SERUM THERAPY, VACCINATION), cleansing of public vehicles, to which reference has been

made, etc. Overcrowded and dark tenements are the most frequent causes of the spread of disease in a community. They keep alive the diseases of childhood—measles, scarlet fever, diphtheria, etc.—and are the most frequent hiding places for the germs of tuberculosis. (9) *Disposal of the Dead* is regulated by sanitary laws, which provide, in cities, that undertakers shall obtain permits for removal of dead bodies, and proper disposition shall be made of them by burial or cremation. Public funerals in the case of contagious diseases are often forbidden, and hermetically sealed caskets are enjoined in such cases by many municipalities.

Mental and Physical Hygiene. To regard the matter from another view point, hygiene may be also divided into mental and physical. The former will necessarily include many questions that belong to the latter, for the healthy action of the mind depends to a great extent upon the health of the body. A sufficient amount of sleep ought to be taken to refresh the powers of the mind as well as those of the body, and that sleep ought not to be much disturbed by dreams. Of course there are those whose occupation demands varied, sometimes excessive, exertion, and who must be "a law unto themselves." The great time for practically applying the laws of mental hygiene is during the years of childhood and youth. The method of teaching the child should be of the simplest as well as of the most comprehensive character, and the periods should be frequent during which its mind is completely relieved of all serious study and allowed to come to a perfectly natural and passive condition by mirthful and affectionate enjoyment. The school-rooms should be commodious and well ventilated, and they should not be overcrowded. Too many studies should not be required, so that hours which should be given to recreation or sleep will not be occupied with laborious efforts of study, which often do little more than produce a disturbed and unrefreshing sleep and pervert or destroy the appetite for wholesome food. In the matter of school hygiene great importance is attached to the amount, arrangement, and distribution of light in the classrooms, the construction of the seats and desks, the type and paper used in making the textbooks, etc. Carelessness in these matters is known to be one of the most fruitful sources of imperfect sight, such as myopia, as well as of various deformities, especially spinal curvature. See SCHOOLS, MEDICAL INSPECTION OF.

Military Hygiene is a system of principles for the preservation and promotion of the health of the soldier. The application of these principles is called military sanitation, which has for its object the prevention of disease. As almost all of the activities designed to preserve the health of the soldier are directed towards the prevention of disease, the term most applicable to the system is "military sanitation." In other armies than the American the administration to which is confided the preservation of health by the prevention of disease and the treatment of sick and wounded is called the "sanitary service", in the United States medical officers and hospital corps soldiers, in the organization of the army, are designated as "sanitary troops."

The direct relation which is so well known to exist between the health of an army and its efficiency as a fighting organization gives vast importance to this subject. The increase of knowl-

edge of the cause of disease has led to the many recent applications in preventive methods. When it is considered that healthy men of military age are subject only to preventable diseases which come from without, it can be readily appreciated that the efforts for military efficiency must be directed continually against the enemy within the ranks, which is far more dangerous and destructive than the enemy without. The study of medicosanitary statistics, of all armies, reveals the overwhelming part the so-called preventable diseases have played in rendering an army noneffective. In the three years' campaign of the British army in South Africa, one-sixth of all the admissions to hospital for disease were due to typhoid fever and dysentery, and these two diseases caused two-thirds of all the deaths from disease and one-half the total losses by death from all causes during the war.

Armies in extended and inactive campaigns rest their fate on sanitary conditions, and more deaths result from disease than from wounds. In short and decisive campaigns the deaths from wounds are greater. In the Mexican War (1846-47) there were 6 deaths from disease to 1 from wounds, in the Crimean War (1854-56) the French ratio of loss was 10 from disease to 1 from wounds, in the American Civil War (1861-65) the ratio was 2 to 1, in the German army (1870-71) it was 12 from disease to 1 from wounds, in the Sino-Japanese War the Japanese ratio was 12 to 1, and in the Spanish-American War the American losses were 12.5 to 1. In the Russo-Japanese War, for the first time in history, the loss from disease was less than from wounds, viz., 1 to 2. It is evident that the efficiency of the sanitary department cannot be determined directly from the ratios of deaths from wounds without a study of the conditions of campaign.

In no other art in late years has there been greater progress than in military sanitation. It has, by its discoveries, inventions, and practices, demonstrated to the civilized world methods for the prevention of disease which could have been developed only under a system of military organization and discipline. The two most important sanitary innovations have followed the demonstration, by Reed of the American army, that yellow fever was transmitted by a mosquito's bite, and the preparation of a vaccine, by Wright of the British army, that protects against typhoid fever. By the first discovery yellow fever was driven out of Cuba and the Isthmus of Panama, and it can be totally suppressed wherever proper sanitary methods can be effectually enforced. Surgeon-General Gorgas, of the American army, made the Panama Canal possible by his military sanitary measures, directed largely towards the extermination of mosquitoes by the destruction of their breeding places and towards the protection of the person against the bites of mosquitoes. General Gorgas says, "The disappearance of malaria from Havana was due solely to mosquito work."

The efficiency of the typhoid vaccination of Wright was first demonstrated in the English army, and since 1911 it has been employed in the American army, where typhoid fever practically no longer exists. This disease was pronounced by Kean in 1905 to be "the most formidable infectious disease with which we have to contend in military life." The incidence of typhoid fever is never an alarming factor in a garrison, but it has been known as a scourge in

camp. After the compulsory vaccination against typhoid fever, in 1911, of every soldier in the United States army, 20,000 men were in camp along the Mexican border with only two cases of typhoid fever infecting satisfactorily vaccinated soldiers. In four large camps in the United States, with a total strength of 55,829 soldiers, during the Spanish-American War, there were 7745 cases of typhoid fever. In the 250,000 volunteer troops assembled shortly after the declaration of war there were 20,000 cases, or 80 cases to each 1000 troops.

Malaria has been brought under control by military sanitation through the discovery, by the French military surgeon Laveran, of the blood parasite which causes the disease, and the demonstration, by Ross of the Indian army, of the manner of transmission by the passage of the parasite from the proboscis of a mosquito of the *Anopheles* species to the patient by the "bite" of the mosquito, and the subsequent introduction of measures to destroy breeding places of mosquitoes. Not a single death from malaria occurred in the United States army between 1906 and 1914, in 1907 there were three cases per thousand admitted to hospital in September, while in 1885 the rate was 31 per thousand.

The two types of dysentery which cause much sickness of the soldier in the tropics are caused, one by an animal parasite (an amœba) and the other by a vegetable organism (a bacillus). Vedder of the American army, in 1912, discovered the specific effect of emetine (a derivative of ipecac) on the amœbic form of dysentery, which cures the disease when administered hypodermatically.

Typhus fever, while it disappeared largely from the armies of the West through their general sanitary progress, remained a great scourge in the armies of the East until the mystery of its transmission was recently solved. It is now no longer feared, because it is known to be transmitted by the bite of the body louse, and means of prevention can be easily adopted.

Cholera is another disease which always threatens armies in the near and far East, but in America and Europe it is of little concern in time of peace, and in time of war it could only arise as a formidable epidemic during a campaign of great privation. It is a disease of Asia and tropical countries, where people live in close quarters and unsanitary surroundings which permit the ready passing of the germ from one to another by personal contact, excreta, food, clothing, and utensils, as the germ must pass into the alimentary tract to cause the disease. The heavy mortality which has given it its name such terror is due to the disorder, privation, or poverty under which it always arises. Water is not a very important means of transmission. The death rate in cholera is 50 per cent and in typhoid fever 10 per cent, but with the same sanitary surroundings and treatment it is almost certain that cholera would become a disease no more fatal than typhoid fever. Cholera frequently occurs in epidemic form adjacent to military posts without infection of the troops, because they are wholly protected by sanitary measures.

In the American army, in 1911, the highest admission rate of all diseases, expressed in numbers for each 1000 men, was, for venereal disease, 163.85, followed next by tonsillitis, 57.14. The highest death rate was, for tuberculosis, 0.52, followed by measles, 0.45. The most frequent

cause for discharge was tuberculosis 2 85, followed by insanity, 1 37. The highest noneffective rate was charged to venereal disease, 3 82, followed by tuberculosis, 1 63.

Another of the great sanitary advances has been made in the control of venereal disease, which has been preeminent in the American and English armies, as compared with others. In 1912 venereal personal prophylaxis was imposed by order upon the American army, and since that time the rate of admission for American troops in the United States proper has been reduced from 163 85 in 1911, to 87 02 for the first six months in 1914, per thousand, but the real reduction has been, perhaps, twice as much as indicated by these figures, because, since compulsory methods of detecting the disease have been enforced by means of regular physical examinations and education, it is probable that twice as many cases have been admitted to record as before. In a command of 1000 men in the United States army the loss of days in one year from this disease would be 1652 before the enforcement of the order and 542 after, or a gain of 1110 days' service in one year. The application of the Wassermann blood test, by which syphilis, in either active or inactive states, can be accurately determined, and the invention of Salvarsan as a specific agent in treatment, has led to renewed energy and efficiency in the treatment of syphilis in the army and with more favorable results, because of the military control, than can be attained in civil life.

The three cardinal principles upon which military sanitation is conducted are (1) The protection of the soldier against himself as the chief transmitter of the diseases from which he suffers (2) The purification of water and the protection of food (3) The destruction of all disease-transmitting animals which attack him from without, such as mites, which cause scabies and "the seven-year itch", ticks carrying Texas fever and Rocky Mountain spotted fever, bedbugs, conveying relapsing fever, typhoid fever and probably kala-azar and leprosy, lice, transmitting typhus fever and recurrent fever, fleas, carrying bubonic plague, cockroaches, conveying all sorts of germs which infect food and milk, and also the germ of tuberculosis, diphtheria, typhoid fever, and tonsillitis, mosquitoes and flies, which, of all the animal transmitters of disease next to mosquitoes, must be considered the most dangerous. After the tsetse fly, which carries the African sleeping sickness, we find the greatest pest and health menace in the common house fly (q v).

The water supply of an army is one of the deepest concerns of the sanitary department, and it involves a care ranging from driving wells to secure a water supply to its purification by heat, filtration, chemical treatment, or the ultra-violet mercury lamp. Many satisfactory processes of water treatment require apparatus of such weight and complication that it is impracticable to carry the apparatus with an army in the field. Heat requires fuel and vessels which are not always at hand. Filtration and violet light require apparatus, but the recent application of a chemical method which uses chlorine has been made in the American army and marks another great advance in military sanitation.

Darnall introduces a pure, dry, liquid chlorine gas, contained under pressure in a steel drum, into a reservoir or pipe of running water. The chlorine's rapid affinity for hydrogen takes

the hydrogen atom from the oxygen atom in the water molecule and leaves the nascent oxygen to destroy quickly and positively all pathogenic organisms. This method, however, is not applicable to the needs of troops in the field on account of the somewhat complicated and heavy apparatus.

Lyster has made the most practicable application of the chlorine agency by using the chlorine-bearing powder, chlorinated lime, which, when added to water in the proportion of 1 to 500,000, effects sterilization in a few minutes. The great advantage of this method is the very little weight of required apparatus, which consists of a bag made of canvas, 38 gallons' capacity and 5 pounds in weight, with six stop-cocks around the bottom for drawing off the water. Sealed glass tubes of chlorinated lime, 15 grains each, containing 30 per cent available chlorine, are carried with the water bag. The simple mixing of the contents of one tube with the water filling the bag sterilizes enough water to fill the canteens of one company of infantry, at war strength, numbering 157 men. The Lyster water bag, adopted by the United States army in 1914, requires no special transportation facilities, as it is carried on the back of the company trumpeter, who, being without a rifle, still carries less than the equipment load of the armed soldier.

The close contact of soldiers living in barracks and camp, under conditions designed to reduce domestic system to minimum limits, favors the transmission of disease, through contact of person, clothing, bedding, and equipment, and the use of common utensils. The sanitary measures directed against this disposition of the soldier to spread his own diseases are based upon the disposal of excreta, protecting of food, and personal hygiene.

The purity, quality, and quantity of the soldier's ration, which contributes so directly to his efficiency, are maintained by the constant vigilance of sanitary examinations and inspections. The American soldier's ration is especially adapted to his needs by the variety and sufficient quantity of its components, which are more liberal than that of any other soldier. The normal fuel value is 3536 calories, which can be ranged from 2500 to 5674 calories by varying the components. Fresh meat, and usually beef of best quality, is issued 7 days in 10.

Military sanitation is inseparable from military discipline. The widely heralded success of Japanese sanitation in Manchuria was not due to any new hygienic discoveries, but only and solely to the severe discipline with which the principles taught by the armies of the Western world were applied. The notoriously strict discipline in the German army, carried out also in its sanitary administration, has reduced its sickness and death rate to the lowest of all armies in the world, and this result has contributed no small part to the incomparable economic advance which the German Empire has made from the time of her War of 1870 to her War of 1914.

The topics included in military hygiene and sanitation are (1) *Sanitary Organization* (2) *Physical Condition and Selection of the Recruit* his physical training, general development and moral education (3) *Marching* care of feet, halts, forced marches, adjustment of equipment and clothing, weather conditions, and general physiological applications. (4) *The Ration* composition, value, and preparation, garrison,

travel (cooked), and emergency rations. (5) *Clothing, Uniform, and Equipment* material, quality, nonactinic property, distribution of weight, garrison and field clothing (6) *Water Supply* examination, protection, and purification (7) *Posts, Barracks, Quarters, and Hospitals* construction, ventilation, heating, and lighting, disposal of wastes (8) *Camp Sites and Camps* temporary and permanent, soil, vegetation, area, tents, varieties of shelter, portable buildings, disposal of wastes and excreta, bathing and washing, prevention of flies, protection against mosquitoes, sanitary rules (9) *Personal Hygiene of the Soldier* daily toilet, bathing, care of bowels, change of clothing, habits, and morality (10) *Prevention of Infectious Disease*, venereal prophylaxis, vaccination against typhoid fever and smallpox (11) *Service in Tropical Countries* characteristics of climate, effects on body and mind; food, beverages, solar rays, actinic rays, sunstroke, clothing, shelter, tropical-disease prevention (12) *Service in Cold Climates* (13) *Disinfection* methods and materials (14) *Sanitation of Troop Ships* (15) *Sanitation of the Battlefield* (16) *Quarantine* Many of the above topics in special or other connections find discussion elsewhere in the *ENCYCLOPEDIA*, and to such articles the reader is referred.

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HYGIENE OF FOOD See *FOOD*

HYGINUS, GAIUS JULIUS A Latin author. He is generally supposed to have been a native of Spain, though some writers assert that he was born in Alexandria, Egypt, and that he came to Rome with Julius Caesar when a mere child. He is known to have been a favorite with Augustus, who made him chief librarian in the new Palatine Library. He was a voluminous writer on many subjects, including biography, agriculture, bee keeping, and military arts, as well as comments on the poems of Vergil and Cinna. These have all been lost. There are also two works still in existence that are assigned to him—one, a textbook on mythology, entitled *Fabularum Liber*, consisting of 277 mythological legends, valuable chiefly because of the use made of Greek tragedies, in many cases now lost, the other, an astronomical treatise entitled *Poeticon Astronomicum Libri IV*, an elementary treatise on astronomy, including the myths connected with the stars, of little value now. This astronomical treatise is based mainly on the *Kataastrologia* of Eratosthenes (q.v.) On stylistic grounds it is held that these extant works, clearly the work of one man, cannot have been written by the Hyginus of the Augustan age, the Latin is defective, and there are serious errors in translation from the Greek. They may be an abridgment, however, of works by Hyginus. The *Fa-*

bulae were edited by Schmidt (Jena, 1872) and the *Astronomica* by Bunte (Leipzig, 1875). Another Hyginus, known as *Gromaticus*, lived probably in the second century and wrote a work on surveying, edited by Gemoll (ib, 1879). Consult Teuffel, *Geschichte der römischen Literatur*, vol 11, § 262 (8th ed, ib, 1910), and Schanz, *Geschichte der römischen Literatur*, §§ 342-350 (3d ed, Munich, 1911).

HYGINUS, SAINT Pope, or Bishop of Rome, about the middle of the second century, possibly 137-141. Very little is known about him.

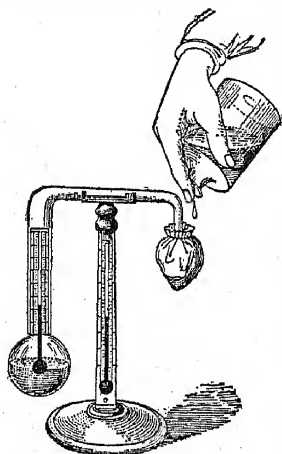
HYGINUS GROMATICUS See **HYGINUS**

HYGROMETER (from Gk *ὕψος*, *hygros*, moist + *μέτρον*, *metron*, measure) An instrument for measuring the quantity of moisture in the atmosphere. In addition to the gases of which it is composed, the air contains the vapor of water, which is invisible except when it is condensed in the form of fog or cloud. The amount of this aqueous vapor varies greatly and depends chiefly on the temperature, being at a minimum on cold days and on warm days forming as much as one-fiftieth part of the air. This vapor exerts a certain pressure depending upon the quantity present and the temperature, and when the latter is sufficiently reduced condensation takes place and fog or dew is formed. When the moisture present in a given case is the maximum possible, the temperature is called the temperature of saturation, and if the temperature is reduced below this point condensation takes place. The temperature at which condensation occurs is known as the dew-point temperature (See *DEW*). The less moisture the air contains the lower will be the dew point, and when this is ascertained experimentally, we can use it to determine the pressure of the vapor at that temperature, as the pressure of water vapor and its relation to temperature has formed the subject of extensive and elaborate experimental researches that are now embodied in carefully prepared tables. It is known that the quantity of water contained in the air varies directly (or nearly) as the vapor pressure, consequently a ratio between the vapor pressures at an observed temperature and the saturation pressure for the atmospheric condition at the time of observation gives the relative humidity. The amount of moisture in the atmosphere is often expressed in terms of relative humidity in the daily meteorological observations, and the chief function of the hygrometer is to afford such data as will enable us to determine this quantity.

Hygrometers can be divided into several classes. There are those in which use is made of the property of certain substances of altering their dimensions or weight upon absorbing moisture from the air. Of this class the most reliable are those in which a hair expands and contracts according as the air is more or less moist, and moves a pointer or index over a scale, and indicates relative humidity direct. This form was invented by Saussure, the Swiss physicist, and a somewhat similar instrument was devised by Deluc in which a strip of whalebone was employed. The instruments are known as hygrometers and are used where other forms of apparatus cannot be employed. Their indications, however, are not highly exact. Another class of hygrometers is based on the principle that certain chemicals will absorb moisture, and the amount thus abstracted from a given volume

of air will give the quantity present in the atmosphere. The apparatus consists of a series of drying tubes containing some hygroscopic material, as substances which readily absorb moisture are termed, through which air is drawn by means of an aspirator or other device. The substances which may be used for this purpose are strong sulphuric acid in pumice stone, calcium chloride, phosphoric acid, and potassium or sodium oxide. The amount of moisture is determined by the increase in weight. The class of hygrometer very generally employed for accurate work includes apparatus where the temperature is reduced until condensation takes place, or this temperature can be determined from the temperature of evaporation. Knowing the dew point for a given condition of the atmosphere, the other data can be readily ascertained.

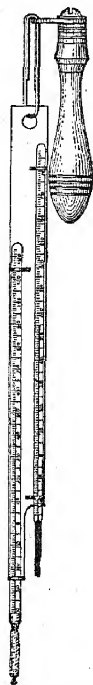
The Daniell hygrometer, which figures extensively in the earlier works on physics and meteorology, consists of two bulbs connected by a bent tube, as represented in the figure, and inclosing a thermometer together with some ether



DANIELL HYGROMETER.

and vapor of ether, the air having been expelled before the tube was sealed. One bulb is either blackened or coated with metal, while the other is covered with muslin. The observer's hand is placed for a short time on the muslin-covered bulb to drive the ether into the opposite bulb, leaving the first bulb and the tube filled with the vapor of ether. A little ether is then dropped from the bottle on the muslin-covered bulb; evaporation instantly takes place, and the temperature is reduced, thus condensing the vapor inside; a fresh evaporation from the other bulb fills the vacuum, and the vapor is again condensed by dropping more ether on the muslin covering, the process being repeated until the temperature of the bulb containing the thermometer is so reduced by successive evaporations (see EVAPORATION) that dew begins to be formed on the outside of the bulb. At the instant this occurs the height of the mercury in the two thermometers is accurately noted—the one giving the dew-point temperature, and the other the temperature of the air. There are other forms of dew-point apparatus, all depending upon this same principle, and the hygrometer of Regnault was devised to remedy some of the defects of the Daniell apparatus. In this instrument a current of air is used to increase the evaporation of the ether, and instead of a glass tube and bulb there is a brightly polished thimble of silver at the base of one of the thermometers, which contains the ether. The air bubbles through the liquid, and the rate of evaporation becomes much more rapid. Knowing the dew point, a reference to the table will furnish the pressure of aqueous vapor at that temperature, and other tables or the application of a formula will give the amount of moisture in a given quantity of air.

Instead of the dew-point apparatus, the wet and dry bulb thermometers, or psychrometer, is now generally employed in making ordinary observations, especially by meteorologists. The instrument consists of two ordinary thermometers—one has its bulb bare, and thus shows the temperature of the air, while the other has its bulb covered with muslin which is kept wet with water. The thermometers are often so united that they can be rapidly revolved in order that the wet bulb may be exposed to a constant current of air. In the illustration is shown the sling psychrometer issued by the United States Weather Bureau, where the thermometers are mounted in such a manner that they can be whirled about the hand of the observer. The evaporation from the muslin and the consequent cooling of the bulb being proportional to the dryness of the air, the difference between the readings of the two thermometers is greatest when the air is driest, and zero when it is completely saturated. The readings of the psychrometer and the dew-point apparatus at the same time have been carefully compared, and it has been ascertained that the vapor pressure at the dew point of air is equal to the vapor pressure corresponding to the temperature of the wet-bulb thermometer minus the number 0.011, multiplied by the difference in degrees between the dry and wet bulb thermometers. This rule is stated as applying when the psychrometer is whirled, and when the pressure of the barometer is equal to 30 inches. From the difference in readings between the thermometers the vapor pressure can be calculated by formulas which, with certain modifications, are based on those used by Regnault.



U. S. WEATHER BUREAU SLING PSYCHROMETER.

Ferrel's formula, used by the United States Weather Bureau in calculating its tables, is as follows:

Let p = vapor pressure of saturation at dew-point temperature.
 p' = vapor pressure of saturation at wet-bulb temperature.
 P = barometric pressure.
 t = reading of dry thermometer.
 t' = reading of wet thermometer.

$$p = p' - .000367 P (t - t') \left(1 + \frac{t - t'}{1571} \right).$$

In practice it is customary merely to take the difference between the wet and dry bulb thermometers and refer at once to the tables, which will give the relative humidity, the amount of moisture in a given quantity of air, and other desired data. These tables and full directions for practical hygrometry are contained in the publications of the United States Weather Bureau, to which the reader is referred for further information, while nearly all the larger treatises on physics contain satisfactory treatment of the subject. Consult Preston, *Theory of Heat* (London, 1904), and M. T. Edelmann, "Neues Absorptions-Hygrometer," in *K. Bayerischen Aka-*

denise der Wissenschaften, Sitzungsbericht, vol xxxvii (Munich, 1907) See HUMIDITY

HY'GROPHYTES (from Gk *ὕγρος*, *hygros*, moist + *φυτόν*, *phyton*, plant) Plants which grow naturally in regions where the atmosphere is moist. Hygrophytes differ from hydrophytes in that they are not necessarily associated with water in the liquid state. Hygrophytic leaves show a number of peculiarities in contrast with xerophytic leaves. For example, hygrophytic leaves do not suffer, but rather thrive, in very moist atmospheric conditions. The leaves themselves are also easily moistened. This type of leaf is very characteristic of the tropical rainy forests, but also is often found in deep narrow cañons and heavily forested ravines. Xerophytic leaves, in contrast with hygrophytic leaves, are not readily moistened and commonly die if subjected to a moist atmosphere. See HYDROPHYTES

HY'GROSCOPE See HYGROMETER

HYKSOS, hik'sōz The name of a dynasty of Egyptian kings, who are known also as the Shepherd kings. Manetho, of whose annals an excerpt is preserved in Josephus, narrates that foreign conquerors from Asia, who were called Hykussos, took possession of Egypt. This name, according to Breasted (*A History of the Ancient Egyptians*, p. 178), in all probability is composed of the word "Hyk" (or ruler) and the word meaning 'countries'. The latter by slight and very common phonetic changes might become "sos." The explanation, based on the mutilated form Hyksos and the interpretation sos as Egyptian *shōs* (shepherd), although attributed to Manetho, seems to have originated at a later time. Consequently we have in this no basis for determining the nationality of those foreigners, "of unknown race," as Manetho says. Usually historians, following this later etymology and the insertion in Manetho ("they are said to have been Phœnicians or Arabs"), consider them as nomadic Semites, either Arabs or Canaanites, recently settled in Palestine. Others have supposed them to be Tuamians, thinking that they found Mongolian features on statues which were for a long time attributed to the Hyk(us)sos, but are now generally recognized as belonging to an earlier period. Nothing positive can be said as to the origin of this people, it is only known that the conquerors had first founded an empire in Syria (coming from the north from Asia Minor?) before conquering Egypt. This explains why many Semites came thither along with them and, later, under their rule. The date of their conquest is doubtful. From the confused extracts from Manetho, they would seem to have formed the fifteenth and sixteenth dynasties, lasting 259 and 251 years respectively, and would thus have begun about 2100 B.C. But the sixteenth dynasty seems to be an erroneous repetition, so that only the fifteenth dynasty with six (?) kings remains, and for these 250 years are certainly too much. Taking into consideration the recently discovered Sothiac date for the twelfth dynasty, not much more than a century would remain for them, and therefore the invasion of the foreigners ought to be placed at about 1657 B.C. (Breasted). The reports of the cruelties and devastations which, according to Egyptian tradition, accompanied the conquest are untrustworthy. In one point, however, the traditional account has been confirmed: the invaders built a strong fortress on the north-eastern frontier of the Delta, in the Sethoite nome, called Avaris (Egyptian, *Hatwaret*), and

placed in it a strong garrison to secure the connection between the Syrian and Egyptian provinces. The conquerors soon adapted themselves to Egyptian manners, leaving probably the old administration untouched, and the kings assumed Egyptian names. Three or four of these royal names have been found on the monuments. Contemporary monuments give the names of three Apophises and Khian, besides possibly Khenger and Jacob-hei (Breasted, op. cit. p. 182). An alabaster vase cover bearing the cartouche of King Khian was found at Onosus in Crete (*Year Book*, 1901, p. 45, cf. *Annual of the British School in Athens*, vii, p. 65). The second Apophis reigned for at least 33 years, as the mathematical papyrus of London written in his reign attests. These kings resided in Memphis, Avaris, and Heliopolis (?), having the Delta under their direct administration and leaving the country above Memphis to tributary princes of the old nobility. This proved fatal to their dominion, for the vassal Prince of Thebes soon felt strong enough to rebel against his sovereign. A popular tale (Papyrus Salher I) gives a fanciful narrative of the beginning of this war in stating that Apophis complained to King Sekeneure in Thebes that the noise of the hippopotami disturbed his slumbers in Avaris, but the mutilated condition of the manuscript renders it difficult to decide whether the foolish arrogance of Apophis or his exaggerated zeal for his god Set is represented as the cause of the struggle. The popular idea that the Hyk(us)sos brought along their own native god of war, Sutekh, and tried to force his exclusive worship upon the Egyptians, is incorrect, this god was merely the Egyptian divinity Set, an "Egyptianized form of some Syrian Baal" (playfully written Sutekh), the local god of the capital, Avaris, who became, of course, the official patron of the kings, but did not dispossess any other cults. The revolt against Apophis (II?) was started by Sekeneure, the Prince of Thebes (which of the three princes of that name is doubtful), and lasted for long years, extending through the reigns of two short-lived Theban princes (Kames and Snekten-rē).

The princes of the nomes north of Thebes were annihilated in the war of independence, as they do not seem to have joined the national cause. When Amasis I (Ahmose, c. 1580 B.C.) ascended the throne, the Pharaohs of the foreign dynasty seem to have been almost completely expelled, but they sustained a long siege in their last stronghold, Avaris. This city fell in the third or fourth year of Amasis Ahmose, and the surviving inhabitants were distributed as slaves. The strange statement in Manetho that Mischragmuthosis (i.e., Thothmes III, c. 1500 B.C.) took Avaris and allowed the remainder of the Hyk(us)sos to retire to Syria, is, of course, erroneous. No remarkable buildings of the Hyk(us)sos kings have survived, only traces of temple restorations in Bubastis and the modern Gebelen. Possibly their constructions were destroyed after the expulsion. A considerable part of Syria seems to have been tributary to them, but the small stone lion bearing the name of Apopi (I?), found at Bagdad on the Tigris, cannot be considered to prove that these monarchs ruled as far as Babylonia. The whole of this interesting portion of Egyptian history is very obscure. Consult Koch, *De Regibus Pastoribus* (Maburg, 1844), Chabas, *Les pasteurs en Egypte* (Amsterdam, 1868), W. M. Muller,

in *Mitteilungen der vorderasiatischen Gesellschaft* (Berlin, 1898), W M F Petrie, *Hyksos and Israelite Cities* (London, 1906), Bristead, *A History of the Ancient Egyptians*, pp 173-189 (New York, 1908)

HY'LA (Neo-Lat, from Gk ὕλη, *hylē*, wood) The typical genus of the tree-frog family, *Hylidæ*, hence the word is often used as a name for tree frogs in general, especially the common variable one (*Hyla versicolor*) of North America. See TREE FROG

HYLÆ'US (Lat, from Gk Ὑλαῖος, *Hylaios*, woodman) In Greek mythology, an Aicadian centaur who pursued Atalanta (see ATALANTA, 2) and was slain by her. In other legends he falls in the fight against the Lapithæ or is slain by Hercules

HYLAS, hyl'as (Lat, from Gk Ὑλας) In Greek legend, son of Theodamas or Theiomenes, favorite of Hercules, who took him on the Argonautic expedition. In Mysia, near the mouth of the Gios, while drawing water from a spring, he was made captive by the nymph of the place. Hercules returned in sorrow to Greece, taking with him hostages of the Mysians and requiring that they should continue the search for his beloved. The story was developed by the later Greek writers and seems to have arisen from a Mysian religious festival, where a priest thence called the name of Hylas. Consult Mannhardt, *Mythologische Forschungen* (Strassburg, 1884), Von Muller, *Handbuch der klassischen Altertums-Wissenschaft*, vol v, 2 (Munich, 1906), Fairbanks, *The Mythology of Greece and Rome*, pp 193, 354 (New York, 1907).

HYLLESTED, hyl'le-stéd, AUGUST (1858-) A Swedish pianist and composer, born of Danish parents at Stockholm, Sweden. He showed great musical precocity, playing in public when only five years old. He studied under Holger Dahl in Copenhagen, until 1869, and then, after making a concert tour in Scandinavia, entered the Royal Conservatory of Copenhagen. In 1876 he was appointed organist of the cathedral there and director of the Nykjøbing Falster, a musical society. Three years later he studied with Kullak and Kiel in Berlin, leaving there to become a pupil of Liszt. He made many notable concert tours in Europe and America and was the recipient of numerous honors. He was assistant director of the Chicago Music College (1886-91) and director of the piano department in the Gottschalk Lyric School (1891-94). In the latter year he went to Europe for an extended concert tour and upon his return, in 1897, settled in Chicago. His compositions, the most popular of which are his songs and piano pieces, include the symphonic poem, *Elizabeth*, for full orchestra and double chorus, *Suite romantique*, *Marche triomphale*, etc.

HYLLUS (Lat, from Gk Ὑλλος) The son of Hercules (qv) and Deianira (qv), married at his father's command to Iole. When Eurystheus was repulsed by the Heraclidæ (qv) with the aid of the Athenians, Hyllus slew him as he fled. Adopted by the Dorian Ægimius in Thessaly, Hyllus gained the leadership of the Dorians (qv) for himself and his descendants. Having invaded the Peloponnesus in obedience to a command of the Delphic oracle to seize the Kingdom of Eurystheus "after the third fruit" he was unsuccessful and was killed in combat by King Echemus of Tegea. The oracle was fulfilled in the persons of his great-grandsons Temenus,

Cresphontes, and Aristodemus, who after the third generation conquered the Peloponnesus. See HERACLIDÆ

HY'LOBATIDÆ (Neo-Lat, from Gk ὕλοβάτης, *hylobatēs*, one that walks the woods, from ὕλη, *hylē*, wood + βαίνειν, *baínein*, to go) A family of Primates comprising the gibbons (see GIBBON). This name, meaning tree walkers, is well bestowed, for their entire lives are passed upon trees, though whose branches they move with the ease of a creature of flight. On the ground they are almost helpless, running with quick, unsteady steps, and holding both arms over their heads to balance themselves. Elliot admits two genera, *Hylobates*, with 12 species, and *Symphalangus*, with one species. They are the lowest, most generalized of the anthropoid apes.

HYLO'DES A genus of cystignathine frogs, of which over 50 species are known in tropical America, all small and like tree frogs, with the fingers free and provided with undivided disks. A typical and familiar species of the West Indies (*Hylodes martinicensis*) has some remarkable traits, described under COQUI.

HY'LOGLYPHS See EASTER ISLAND

HY'LOPHYTES (from Gk ὕλη, *hylē*, forest, matter + φυτόν, *phytón*, plant) Plants which grow in the woods, forest plants. The hylophytes are contrasted with the poophytes, i.e., the plants of grasslands.

HY'LOZO'ISM (from Gk ὕλη, *hylē*, matter, wood + ζῶν, *zōn*, animal). The assumption that the principle of all change is to be found in material substance, and that all matter is instinct with life. The term is applied to the Ionic school (see GREEK PHILOSOPHY), which sought the explanation of the universe in terms of water, air, fire, etc., and thus assumed, without further investigation, that matter in one form or another had in it "the promise and potency" of all change, including vital processes.

HYMANS, é'man', SALOMON LOUIS (1829-84) A Belgian historian, poet, and publicist, born at Rotterdam, known simply as Louis Hymans. He was editor of various papers and director of the *Écho du Parlement*, a Liberal journal. He was elected a member of the Belgian Chamber of Representatives for the city of Brussels (1859), held that post for 11 years, and showed himself an upright and conscientious politician. He was the author of several novels, of *Lettres moscovites* (1857), *Histoire parlementaire de la Belgique* (18th ed, 1880), *Histoire populaire du règne de Léopold I* (1864), *Histoire politique et parlementaire de la Belgique* (1869-70), *Notes et souvenirs* (1876), *Types et silhouettes* (1877), reminiscences, *Bruelles à travers les âges* (1883-89).

HY'MEN, or HY'MENÆ'US (Lat, from Gk Ὑμῆν) Originally the Greek name of the marriage song, later the Greek god of marriage, of whom many varying legends were told. The myths usually represent him as son of Apollo and a Muse, more rarely of Dionysus and Aphrodite. In art he is usually represented as a youth of delicate, almost feminine beauty, with a crown of flowers, a bridal veil, and a bridal torch, more rarely with wings. As the marriage procession waited before the house of the bride, and later, as it conducted her from the house of her father to that of her new-made husband, Hymen was invoked. Consult Schmidt, *De Hymenæo et Talasio* (Kiel, 1886), Usener, *Gotternamen* (Bonn, 1896), Darem-

berg and Saglio, *Dictionnaire des antiquités* (Paris, 1873-1914), Catullus, lxi-lxii, with comments of the editors

HYMENIUM In plants, a layer of spore-producing cells. The term is used chiefly among the Ascomycetes (qv) and Basidiomycetes (qv) to designate a layer of asci in the one case and a layer of basidia in the other. For example, the scarlet lining of the scarlet-cup fungus is a hymenium (sometimes called hymenial layer) composed of asci, while in the common mushrooms the gills are covered by a hymenial layer composed of basidia.

HYMENOCEPHALUS (Neo-Lat., from Gk *ὑμήν*, *hymēn*, membrane + *κεφαλή*, *kephalē*, head). A genus of small pelagic fishes of the tropics, of the family Macruridae (see GRENADE), noted for the papery nature of the bones of the cranium. The only known species (*Hymenocephalus cavernaeus*) is gray, with silvery tints on the sides, and was taken from deep water in the Gulf of Mexico. See Plate of CODFISH AND ALLIES.

HYMENOMYCETES, *hi'men-ō-mī-sē'tēz*. A great division of Basidiomycetes (qv), distinguished by the fact that the hymenium (qv) is freely exposed, as in the ordinary mushrooms. The contrasting group is the Gasteromycetes, in which the hymenium is inclosed, as in the puffballs.

HYMENOPHYLLITES, *hi'men-ō-fil-lī'tēz*, AND **HYMENOPHYLLUM** (Neo-Lat. nom. pl., from Gk *ὑμήν*, *hymēn*, membrane + *φύλλον*, *phyllon*, leaf). A genus of ferns, usually called "filmy" ferns on account of their delicate leaves. *Hymenophyllum* and *Trichomanes* are the two genera which characterize the family Hymenophyllaceae, a family including approximately 250 known species and displayed chiefly in the tropics. One or two species of *Trichomanes* occur in temperate North America, but filmy ferns are an attractive feature of almost every large greenhouse. The sori (fruit dots) are borne in an unusual way among ferns. Instead of being distributed over the under surface of the leaf, they occur on the margin, at the ends of veinlets, each sorus being invested by a cup-like indusium. It was once supposed that the representatives of this family lived in very ancient times, but there is no satisfactory evidence of the existence of the family even as early as the Mesozoic. It is evidently one of the more modern fern families rather than the most ancient family, as was formerly supposed. See FERN.

HYMENOPTERA (Lat. nom. pl., from Gk *ὑμενόπτερος*, *hymenopterōs*, membrane-winged, from *ὑμήν*, *hymēn*, membrane + *πτερόν*, *pteron*, wing). An order of insects, containing the ants, bees, wasps, ichneumon flies, sawflies, gall-flies, and related insects, elsewhere described under their names. The order includes a very great number of species, estimated at about one-fourth of the whole class, of which some, as ants and bees, are singularly interesting and important. They have the mouth furnished with mandibles for cutting and tearing, but the other parts of the mouth are adapted for suction, and are generally narrow and elongated, often united into a kind of proboscis, as in bees. (See BEE.) The antennae are generally slender, but often exhibit differences in the sexes of the same species. The wings are four in number, the first pair larger than the second, the wings of the same side united in

flight by little hooks. When at rest, they are laid over one another horizontally over the body. The wings are entirely membranous, not reticulated as in the Neuroptera, but with comparatively few nervures, the arrangement of which is so constant in the whole order that particular names have been given to them and to the space between them, and their diversities have been made use of in classification. The wings are wanting in the imperfectly developed females ("neuters") of some. Besides the ordinary eyes, all the Hymenoptera have three small, simple eyes (ocelli), on the top of the head. The abdomen is generally united to the thorax by a slender pedicel. The abdomen of the females is generally furnished with an organ capable of being protruded, but for different purposes in different sections of the order, it being in some of the groups an ovipositor or borer, and in others a sting.

The Hymenoptera in their perfect state generally feed on honey, but some of them prey on other insects, which are the food of the larvæ of a greater number, while the larvæ of some feed on various vegetable substances. The metamorphoses of the insects of this order are perfect, the larvæ are generally—although not in all the families—destitute of feet, the pupæ take no food. The Hymenoptera are remarkable for the dilatation of the tracheæ, or air tubes, into vesicles and the general perfection of the respiratory system. The instincts and even apparent intelligence displayed by some of them—particularly the social kinds, which live in communities—have excited admiration from the earliest times. See INSECT, *Social Insects*.

Fossil Hymenoptera. These appear in the Mesozoic formations in small numbers. Only about a dozen species are known, mainly from the Jurassic limestones of Solenhofen, Bavaria. The oldest hymenopterans are ancestral to the modern ants. In the Tertiary deposits are found representatives of all the important families in fossil forms very close to the modern species. In America the best examples are found at Florissant in Colorado, and in Europe the freshwater shales of Aix, Emmingen, and Radoboj, and, best of all, the amber of the Baltic Provinces, are noted localities. Consult Scudder, "Systematic Review of our Present Knowledge of Insects," in *United States Geological Survey Bulletin*, No. 31 (Washington, 1886).

Classification. The order Hymenoptera is divided into two suborders, each containing several superfamilies, as follows:

Suborder *Heterophaga*—Superfamilies, Apoidea, true bees, Iphecioidea, solitary wasps, Proctotrypoidea, proctotrypoid parasites, Vespoidea, social wasps, Formicoidea, ants, Ichneumonoidea, ichneumon flies; Cynipoidea, gall-flies, Chalcidoidea, chalcids flies.

Suborder *Phytophaga*—Superfamilies, Siricoidea, horn-tails, Tenthredinoidea, sawflies.

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HYMETTUS (Lat, from Gk Ὑμηττός) A mountain range in Attica, about 3400 feet high, now called Tielo-Vouni, between 4 and 5 miles east and southeast of Athens, famous to-day, as well as anciently, for its honey of excellent flavor. There was also quarried at Hymettus a bluish-gray marble, much prized in antiquity, though less highly than that of Pentelicon (qv).

HYMNOLOGY (Gk ὑμολογία, *hymnologia*, from ὑμολόγος, *hymnologos*, singing hymns, from ὕμνος, *hymnos*, hymn, connected with Skt *syūman*, bond, Lat *suave*, to sew, Gk *κασάειν*, *kassyein*, to make shoes, OChurch Slav *šiti*, to sew, Goth *suujan*, OHG *suujan*, AS *seouian*, Eng *sew* + Gk -λογία, *logia*, account, from λέγειν, *legein*, to say). The science of hymns, or the collective body of hymns used at a particular time or place. In the most general sense a hymn is a religious ode or poem, more specifically it is a metrical composition divided into stanzas or verses, intended to be used in worship. In some variety or form the hymn has been thus employed throughout the ages. The use of hymns grows out of the use of music in worship. Rhythm early began to be used both to produce and to express emotion. Wherever religion became emotional, it used rhythm in both dance and music. When the worship became in any degree formal, the rhythm expressed in poetry tended to become a part of a traditional ritual and produced the typical hymn. Two ancient collections of hymns of especial interest have come down—the Babylonian and the Vedic. The Babylonian were closely connected with incantations, but sometimes were appeals to the gods for aid in sickness or trouble—the so-called “penitential hymns” (Consult Jastrow, *Religious Belief in Babylonia and Assyria*, New York, 1911). The Vedic hymns were part of the ritual of sacrifice, primarily to designate the particular god for whom the sacrifice was intended (*Sacred Books of the East*, vols xxxii, xli). In Persia the Avesta had a collection of hymns, some of which, the Gathas, were ascribed to Zoroaster (*Sacred Books of the East*, vol xxxi). The religion of ancient Egypt produced hymns sung at the processions of worship (Consult Wiedemann, *Religion of the Ancient Egyptians*, New York, 1897). Confucius made a collection of poetry, the *Shih King*, 40 pieces of which are called “praise songs” or “songs of the temple and altar” (*Sacred Books of the East*, vol iii). Greece was the land of song, and there was heard a song on every occasion by every class to celebrate every event. The so-called Homeric hymns consist of poems of praise to the gods. Callinus, the father of elegy (c 700 B C), and Archilochus, a contemporary, wrote hymns, but none of them have reached us.

The Hebrew race produced the highest development of worship poetry before the Christian era, and it is a generally conceded fact that the Hebrew Psalter has never been equaled as a whole. The Psalter was the hymn book of the second temple, built after the exile. It consists of 150 Psalms, presenting a wide variety of religious experience and literary quality (See **PSALMS**). Habakkuk iii is also taken from a collection of hymns.

There is abundant evidence showing that the early Church made use of singing in its services of worship. Thus, Pliny in his letter to Trajan (103 A D) states “They [the Christians] had

been accustomed to come together on a fixed day before daylight and to sing responsively a song to Christ as God.” What songs were used in these early days is not definitely known. We have one hymn entire appended to *The Instructor* of Clement of Alexandria (c 200 A D). It is the earliest Christian hymn extant and may be Clement’s, though by some supposed to be earlier than his time. It is entitled *A Hymn to Christ the Saviour*. The best translation is by Dean Plumptre, but the most common one is by Henry M. Dexter, beginning “Shepherd of tender youth.”

Both the Eastern and the Western churches after their separation produced many hymns—some strongly dogmatic, but others purely devotional. Numbers of these have come down to us and either in translations or free adaptations have been used more or less constantly by various branches of the Church. Prominent among the hymn writers of the Eastern church were Gregory Nazianzen (died 390), Anatolius (died 458), author of the hymn translated “Fierce was the wild billow”, Romanus (died c 720), St Andrew of Crete (660-732), one of whose hymns is in common use in Dr Neale’s translation, “Christian, dost thou see them”, Cosmas (died 780), John of Damascus (died c 787), author of the hymn, “The day of resurrection” (Dr Neale’s translation), Stephen of St Sabas (died 794), author of “Art thou weary, art thou languid?” (Dr Neale’s translation), and the poets of the Stadium—Theodore (died 826), Joseph (died c 830), author of “Safe home, safe home in port” (Neale’s translation), and Theoctistus (died c 890), whose best-known hymn is translated “Jesu, name all names above.”

A considerable list of hymn writers is associated with the Western church. Attention can here be called to but few. Both Hilary of Poitiers (died 366), who gained much of his inspiration from his enforced exile to Asia Minor, and Ambrose, Bishop of Milan (died 397), did much for the music of the Church. Ambrose in particular developed the music of the service of public worship, until the singing of his congregation, led by his trained choir, became widely known and of far-reaching influence. It is feelingly mentioned by Augustine. Over 90 of the hymns of the Ambrosian school are still in existence, a number of which are attributed directly to Ambrose. *Te Deum Laudamus*, “the most famous nonbiblical hymn of the Western church,” has been credited to Ambrose, but critical scholarship now places it as late as the middle of the fifth century, author unknown. Prudentius of Spain (died early in the fifth century) and Sedulius (also of the fifth century), who was born in the British Isles, produced excellent hymns. With Gregory “the Great,” Bishop of Rome (died 604), and Fortunatus, Bishop of Poitiers (died 609), author of *Veni, Sancte Spiritus*, “The royal banner is unfurled,” and of “Welcome, happy morning” as translated by Ellerton, begins the mediæval period of Latin hymnody. In the development of the “Gregorian” system of Church music the office of song was restricted to trained choirs. Many hymns of the Middle Ages are still in use in the Catholic church, and many have been translated or adapted into English and other languages. Among the best known of these hymns are the following *Veni, Sancte Spiritus* (Come, Holy Spirit), attributed to Robert II

of France (died 1031), and *Salve, Caput cruciatum*, by Bernard of Clairvaux (died 1153), from which several familiar English hymns are derived, including "Jesus, the very thought of Thee" and "Jesus, Thou joy of loving hearts." Bernard of Cluny (died 1156) was the author of a long poem, styled by Dr. Neale "Rhythm on the Celestial Country," from which are taken "Brief life is here our portion," "For thee, O dear, dear country," "Jerusalem, the golden," "Jerusalem, the glorious," and other English hymns. One of the grandest hymns of all times is the judgment hymn of Thomas of Calaneo (died c. 1250), *Dies iræ* (Day of wrath). One of the most tender of all hymns is the *Stabat mater* by Jacopone da Todi or Jacobus de Benedictis (died 1306).

Nearly all great religious movements have been accompanied by the use of hymns written directly to aid such movements or because of the phases of religious thought awakened by them. The leaders of these movements from Luther to Moody have found the hymn singing in their public services to be one of the most potent forces in interesting and impressing their followers. A marked illustration is found in the history of the Wesleyan movement, and at the present time may be noted the efforts towards an appropriate hymnody in the Christian Science movement and on the part of those leading the American church in its activities for social welfare.

Among the great results of the Reformation were the use of the vernacular in public worship and a greater participation of the congregation in the services. Whereas to the choirs exclusively had been assigned the musical features of the service, under the Reformation the congregational singing of hymns became of importance.

Luther was the first hymn writer of the German church, enriching its worship with no less than 37 hymns. The best known is *Ein feste Burg ist unser Gott* (A mighty fortress is our God). The first evangelical hymn book of 1524 contained eight hymns. Subsequent editions contained more and more until that of 1553 contains 131. Coworkers with Luther added much to the hymnology of the Church. Jonas, Eber, Alber, Spengler, Hans Sachs, Speratus, and others among the early Reformers published hymns of value. The Bohemian Brethren, notably Michael Weisse (died 1534), furnished a number of hymns in this period. Then hymns breathed a deep spiritual atmosphere. The French Reformation produced the poetical translation of the Psalms by Clément Marot (died 1544) and Theodore Beza (died 1605), the German Reformed hymn book of 1540, published at Zurich, and the Genevan Psalter of Calvin of 1562. In England the Reformers issued Miles Coverdale's *Goostly Psalmes and Spirituall Songes* (London, 1539); Robert Chowley's versification of the Psalter and Litany (1549), and, last and most famous of all, the rendering of the Psalms by Thomas Sternhold and John Hopkins (1560).

The time of the Thirty Years' War was marked by the production of many fine German hymns of a more or less martial character. Writers of hymns prior to 1650 were Opitz, Heermann, Altenburg, who composed part of the battle hymn of Gustavus Adolphus, "Fear not, O little flock, the foe"; Fleming, author of the "Pilgrim Hymn," beginning "In all my deeds"; and Rinkart, who composed the German

Te Deum Nun danket alle Gott (Now thank we all our God).

Germany continued to produce great hymns and hymn writers after this period. Paul Gerhardt (1607-76) wrote 123 hymns. Many have been translated into English, and some are in common use. Probably the most familiar is "O sacred head, now wounded," adapted from Bernard of Clairvaux and translated from Gerhardt by J. W. Alexander and others. Johann Franck (1618-77), burgomaster of Guben, anticipated the Pietists in his mysticism as shown in his hymns. Johann Rist (1607-77) produced 610 hymns, a few having merit. Johann Scheffler, known as "Angelus Silesius" (1624-77), was a writer of force, and some of his hymns are yet used. All the hymns of the period are somewhat mystical in their teachings.

Pietism was a reaction against Protestant Scholasticism and swung to the other extreme of Mysticism. The leaders of the movement, Philipp Jacob Spener (1635-1705) and August Hermann Francke (1663-1727), wrote a few hymns. Christian Friedrich Richter (1676-1711) wrote 33 hymns. Johann Anastasius Freylinghausen (1670-1730) wrote a few hymns, and published the first hymn book of the movement at Halle in 1704. Gottfried Arnold (1666-1714), the Church historian, wrote several hymns of value. Joachim Lange (1670-1744), a friend of Francke, wrote the morning hymn, *O Jesu, suesses Licht* (O Jesus, sweet light). Johann Friedrich Starck (1680-1756), of Frankfurt, wrote 939 hymns. Karl Heinrich Bogatzky (1690-1774) wrote hymns as well as devotional works, and Philipp Friedrich Hiller (1699-1769), of Wurtemberg, among others who might be mentioned, wrote many hymns. The Moravian church has developed a beautiful ritual and has produced many fine hymns, numbers of which have been translated by John Wesley, Miss Catherine Winkworth, and others. Count Nicolaus Ludwig Zinzendorf (1700-60) produced more than 2000 hymns, over 200 of which appear in the English Moravian hymn book "Jesus, Thy blood and righteousness" and "I thirst, thou wounded lamb of God," have been favorite translations from his hymns. Bishop August Gotthelb Spangenberg (1704-92) wrote 10 hymns. That on Christian simplicity, beginning "Holy simplicity, miracle of grace," written as a birthday hymn for his sister, is considered his best. The inspiration of the hymnology of the Evangelical Revival in England can be traced directly to the Moravian Brethren. To this period belong a few other hymn writers of note, such as Joachim Neander (1650-80), sometimes called the "Psalmist of the New Covenant," and Friedrich Adolph Lampe (1683-1729), the author of 30 hymns. Gerhard Tersteegen (1697-1769), a ribbon weaver, produced 111 hymns, some of which are worthy to be placed in the first rank. From Tersteegen we have several hymns by translation, including "Thou hidden love of God" and "God calling yet, shall I not hear?" From this school we have the first introspective hymns of value.

The nineteenth century saw renewed interest in German hymnody, led by Schleiermacher, Harms, and Arndt, resulting not only in new hymns but in the restoration and careful editing of the old. To writers already mentioned should be added the names of Spitta (died 1859), Albert Knapp (died 1864), author and compiler, and Karl Gerok (died 1890).

The French church has produced comparatively few hymn writers, the one notable name in recent times being Cesar Malan (died 1864), author of a great number of hymns, one of which is *Non, ce n'est pas mourir* (No, no, it is not dying)

The hymns of the Evangelical Revival are not by any means the first great hymns produced in England. The Elizabethan period produced the hymns by F B P (the initials may stand for Francis Baker, pater, i.e., priest), "Jerusalem, my happy home" and "O mother dear, Jerusalem," translated from the Latin and variously revised, also the first English hymn book. This was by George Wither and was published in London in 1623. To the next half century belong Robert Herrick (1591-1634), John Milton (1608-74), Henry Vaughan (1622-95), and Jeremy Taylor (1613-67). In the Restoration period Samuel Crossman published *The Young Man's Meditation* (1664), which contains several hymns, a good specimen of which can be seen in Lord Selborne's (Sir Roundell Palmer) *Book of Praise* (1863). Henry More in his *Divine Dialogues* (1668) published seven long hymns on the festivals of the Church. But the greatest lyric poet of the period was Thomas Ken (1637-1711), the good Bishop of Bath and Wells. His evening, morning, and midnight hymns stand at the head of all worship poetry of the English language. The first two—"All praise to Thee, my God, this night," concluding with the 'long-metric Doxology,' "Praise God from whom all blessings flow," and "Awake, my soul, and with the sun"—have never been surpassed and hardly approached. Joseph Addison, his contemporary, furnished a few hymns of an exalted character, including "The spacious firmament above." In 1683 John Mason published *Songs of Praise*, a hymn book which went through many editions. Benjamin Keach published *Spiritual Melody* (1691), the first Baptist hymn book. Among Independents the first hymn book used was *A Collection of Divine Hymns* (1690). The metrical version of the Psalms by Steinhold and Hopkins was followed by that of Francis Rouse (1646), and that in turn by Nahum Tate and Nicholas Brady (1696), which exerted a great influence. The favorite Easter hymn, "Jesus Christ is risen to-day," is a translation by Tate and Brady from the Latin. The tendency, however, came to be less and less to base hymns on the Hebrew Psalter for a whole hymn book. A preparation for the work of Isaac Watts (1674-1748), sometimes called the "father of English hymnody," was thus made. His hymns have been more widely sung than those of any other English writer, with the possible exception of Charles Wesley. His first work, *Horæ Lyricæ*, appeared in 1706, *Hymns and Spiritual Songs* in 1707. Besides these he published *Divine and Moral Songs for Children* (1720), long extremely popular. While many of Watts's hymns are commonplace and contain unmusical lines, others are alive with finely poetical conceptions and expressions. Among the many still in common use are "O God, our help in ages past," "The heavens declare Thy glory, Lord," and "When I survey the wondrous cross." To the school of Watts belongs Philip Doddridge (1702-51), author of "Awake, my soul, stretch every nerve." His hymns were almost all written to follow sermons, reinforcing the truth which had been preached. The

Wesley family, and the men who gathered about them, both in and out of the Church of England, were prolific writers and produced some of the best hymns in the history of the Church. Samuel Wesley (1662-1735) was no mean poet. His son John (1703-91) translated several hymns and mended many more. Samuel, Jr. (1691-1739), wrote some hymns. To Charles (1707-88), however, we must turn as the leader of the lyrical forces of the Evangelical Revival. He wrote over 6000 hymns. Out of 325 standard hymns James King assigns 22 to Charles Wesley, a larger number than is ascribed to any other writer. At the present time not far from 400 of his hymns are in common use, including "Come, thou Almighty King," "Love divine, all love excelling," "Jesus, lover of my soul," and many other favorites. Charles Wesley's hymns include a wider range of subjects than those of any other hymnist. They chronicle the events of the time as well as the devotional experiences of the writer. Some were impromptu. Many have bits of personal history as a background. Around some hymns have grown beautiful stories, the historical data for which are exceedingly slight. The original hymn books of the Wesleys were issued in 13 volumes under the direction of George Osborn (London, 1688-72). Thomas Olivers (1725-99), John Cennick (1718-55), Edward Peronet (1721-92), author of "All hail the power of Jesus' name," and John Bakewell (born 1721), were of the Wesleyan party, while John Gambold, the Moravian (1711-71), Joseph Hart (c. 1712-68), Miss Anne Steele (1717-78), author of "Father, whatever of earthly bliss," John Newton (1725-1807), author of "Glorious things of thee are spoken," William Cowper (1731-1800), author of "O for a closer walk with God," Robert Robinson (1735-90), John Fawcett (1740-1817), Augustus Montagu Toplady (1740-78), author of "Rock of ages, cleft for me," Joseph Swain (1761-96), William Williams (1717-91), and still others were more or less affected by the movement. The hymns of the movement are characterized by greater breadth of view than any previously issued. They include hymns of all kinds, but very few didactic hymns.

Hymns of modern days seem to have been produced by small groups of men representing some movement or belief. (a) The missionary movement produced James Montgomery (1771-1854) as its first hymn writer and Reginald Heber (1783-1826) as its ablest. Both produced many hymns other than missionary. One of Montgomery's best hymns is "Angels from the realms of glory." Among Heber's hymns are "Holy, holy, holy, Lord God almighty," "The Son of God goes forth to war," and, foremost of missionary hymns, "From Greenland's icy mountains," the musical setting of which turned Lowell Mason from banking to music. (b) The Oxford movement was characterized by its hymnological productions as well as its works of devotion and argument. John Keble (1792-1866), author of "Sun of my soul, Thou Saviour dear," with his *Christian Year*, Frederick William Faber (1814-63), the favorite Catholic poet, many of whose hymns are still gaining in popular use, such as "Hark, hark, my soul! angelic songs are swelling," "O Paradise, O Paradise," and "Souls of men, why will ye scatter," sometimes beginning "There's a wideness in God's mercy," Edward Caswall (1814-

78), John Henry Newman (1801-90), author of "Lead, kindly light," and Isaac Williams (1802-65) were the singers of this group. Their work evinced not only a deep piety but an unsurpassed scholarly finish. (c) The Sunday-school movement has originated a vast number of hymns. It has also borrowed freely from the Church hymnals. Many of its hymns have been worthy, while others have been lacking in poetry and dignity. Certain of its hymns with their musical settings foreshadowed the hymns and music of the evangelistic movement. Recent tendencies in the Sunday-school movement have been steadily towards improvement in both hymns and music. In America the publication of Sunday-school hymnals, with words and music printed together, considerably antedated similar Church hymnals. (d) The evangelistic movement of Moody and Sankey brought into the Church a class of hymns widely differing from the greater part of those produced by any other movement. Many were not of high order—in fact, were quite the contrary—while others have had value, though more or less transient. Few hymns of any kind have attained a more instant popularity than Miss Claphane's "There were ninety and nine." Beginning with *Select Hymns, The Gospel Hymns* in six numbers (1875-95) were followed by hymn books whose name is legion and whose copies are millions. The most voluminous writer of this movement has been "Fanny Crosby" (Mrs. Frances Jane [Crosby] Van Alstine), many of whose hymns have merit, and some of which have attained great popularity, as, e.g., "Safe in the arms of Jesus." It should be said that many of the countless imitators of the earlier evangelists have come far from the standards originally set. (e) The Salvation Army has not added much to the hymnology of the Church, it has, however, changed the class of music used and not for the better. (f) The Christian Science movement has produced numerous original hymns and has altered others to suit its peculiar tenets. (g) The most recent movement in hymnody is that of social workers. The hymns collected by the *Survey* and first published Jan. 3, 1914, are deserving of mention.

Four women have written hymns any one of which is worth a lifetime to produce. Mrs. Sarah Flower Adams (1805-48), "Nearer, my God, to Thee"; Miss Charlotte Elliot (1789-1871), "Just as I am without one plea"; Miss Phoebe Cary (1824-71), "One sweetly solemn thought"; and Mrs. Phoebe H. Brown (1783-1861), "I love to steal awhile away."

In America, the Unitarians have produced some remarkable hymn writers, such as John Pierpont (1785-1866), the Longfellow, Henry Wadsworth and Samuel—the latter a leader in Church music, compiler of hymn books, and author of a number of fine hymns, including "Holy Spirit, Truth divine" and "O life, that maketh all things new"; Edmund Hamilton Sears, author of "It came upon the midnight clear"; Theodore Parker, author of "O Thou great friend to all the sons of men"; and Oliver Wendell Holmes, author of "O love divine, that stooped to share" and "Lord of all being, throned afar." The Protestant Episcopal church has to offer the names of Bishop George W. Doane (1799-1859), author of "Softly now the light of day" and "Fling out the banner"; the Rev. William A. Muhlenberg (1796-1879), Bishop George Burgess (1819-66), and Bishop Phillips Brooks,

author of "O little town of Bethlehem." The Presbyterian church has, among others, Thomas Hastings (1784-1872), early worker for improvement in Church music, George Duffield, author of "Stand up, stand up for Jesus", the Alexanders, James W. and Joseph A., Mrs. Elizabeth Prentiss, and Charles S. Robinson, compiler of many hymn books, excellent for their time. The Congregationalists have the names Timothy Dwight (1752-1817), author of "I love Thy kingdom, Lord", Leonard Bacon, author of the hymn for Forefathers' Day, "O God, beneath Thy guiding hand", Rav Palmer, author of "My faith looks up to Thee", Harriet Beecher Stowe, author of "Still, still with Thee, when purple morning breaketh", and Washington Gladden, author of "O Master, let me walk with Thee." The Baptists furnish a long list, including the names of Oliver Holden (1765-1844), better known as the composer of "Coronation", Adoniram Judson, Miss Scourney, Robert Lowrie, William Howard Doane, and Samuel Francis Smith (1808-95), author of "My country, 'tis of thee" and "The morning light is breaking." The Methodists produced the first hymnologist of America, David Creamer, whose *Methodist Hymnology* appeared in New York in 1848. Other Methodist hymn writers are Miss Hannah F. Gould, Thomas Stockton, President William F. Warren, and Prof. Caleb T. Winchester. Among many other American hymn writers who might be mentioned are John Greenleaf Whittier, the Quaker poet, author of "Immoital love, forever full," sometimes beginning "We may not climb the heavenly steep", Daniel C. Roberts, author of "God of our fathers, whose almighty hand", and Katharine Lee Bates, author of another excellent national hymn, entitled "America, the beautiful."

England has produced a great number of fine hymns in recent years. From many names of writers and from countless hymns a few selections will be made. From the Church of England, Christopher Wordsworth, "O day of rest and gladness" and "The day is gently sinking to a close"; Henry Alford, "Ten thousand times ten thousand"; J. S. B. Monsell, "Sweet is Thy mercy, Lord"; John Mason Neale, many of whose translations have here been quoted, author also of many hymns, Sir Henry W. Baker, "The King of Love my shepherd is"; John Ellerton, "Saviour, again to Thy dear name we raise"; William W. How, "O Jesu, Thou art standing"; and "For all the saints, who from their labours rest"; Samuel John Stone, "The Church's one foundation" and "Weary of earth." Among other English writers of note are Horatius Bonar, "I heard the voice of Jesus say" and "Upward, where the stars are burning"; Frances Ridley Havergal, whose hymns of consecration are especially well known, Henry Francis Lyte, whose hymn, "Abide with me, fast falls the eventide," is hardly excelled, S. Baring-Gould, whose "Onward, Christian soldiers" has earned enormous popularity.

Hymns, Ancient and Modern, originally compiled by a committee of which Sir H. W. Baker was secretary, and published in London in 1861, with supplemental hymns published in 1889, *The Congregational Psalmist* (1858), edited by Henry Allon, and *Church Hymns* (1871), edited by Canon John Ellerton, are the greatest hymn books of England. *The Plymouth Collection* (1855), by Henry Ward Beecher, an early ad-

vocate of congregational singing, the Protestant Episcopal *Hymnal* (1871) and subsequent revisions, the Baptist *Praise Book* (1871) and its successors, the *Methodist Hymnal* (1878), recently revised, *Church Song*, by M W Stryker, the *Evangelical Hymnal* (1880), by Hall and Lasar, *Laudes Domini* (1884), one of a notable series by Dr Robinson, *In Excelsis, Hymns of the Faith*, by Harris and Tucker, the *Presbyterian Hymnal* (1895), *Church Hymns and Tunes* (1906), by Turner and Biddle, the very recent *Pilgrim Hymnal*, and the *American Hymnal* (1913)—are noteworthy hymnals of America. They show striking progress in quality of hymns and music as well as in the art of bookmaking. There are several notable hymnological collections in this country. The Lowell Mason library is in Yale University. The Creamer collection is at Drew Theological Seminary, Madison, N J. Hubert P Main has a collection of great value, and Hartford Theological Seminary possesses a large, unique, and most valuable collection.

Bibliography. It has been estimated that there are at least 400,000 hymns in all languages, of which the greatest number are in German and the next greatest number are in English. The literature on the subject is consequently becoming quite large. The great thesaurus of information is J Julian's *Dictionary of Hymnology* (London and New York, 1892, rev ed, 1907), the labor of many years and of many hymnologists. It covers the entire field and contains separate articles upon the hymnology of the different periods and lands. A F W Fischer's *Kirchenlieder-Lexikon* (Gotha, 1878-79) is also very good. For the study of early Greek and Latin hymns the standard work is H A Daniel's *Thesaurus Hymnologicus* (Leipzig, 1855), which gives the text of many hymns, for the Latin medieval hymns, a work of similar rank is F J Mone's *Latinsche Hymnen des Mittelalters* (Freiburg, 1853). For German Protestant hymnology to the seventeenth century, the great work is P Wackernagel, *Das deutsche Kirchenlied von der ältesten Zeit bis zu Anfang des XVII Jahrhunderts* (Leipzig, 1864-77). J M Neale, by his *Medieval Hymns and Sequences* (London, 1851), *Hymns of the Eastern Church* (ib, 1862), and other similar works, contributed much to a knowledge of the hymnology of the Eastern and Western churches of the Middle Ages. A fairly creditable book on Latin hymns is S W Duffield's *Latin Hymn-Writers and their Hymns* (New York, 1889). A recent book is D J Donahue's *Early Christian Hymns* (1st and 2d series, Middletown, 1908, 1911).

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Hymnology, with a Sketch of his Life (London, 1896). On German hymnology, consult Winkworth, *Lyra Germanica* (London, 1855) and *Christian Singers of Germany* (ib, 1869), and for the hymns of Luther especially, Bacon, *Hymns of Martin Luther* (New York, 1883). There are several commentaries on hymns that are very well done. Hyde, *Hymnal Sermon Pictures* (ib, 1899), does what is done nowhere else and is most complete in the analysis of the hymns he discusses. Commentaries on denominational collections are Biggs, *Hymns, Ancient and Modern* (London, 1867), giving annotations on the hymns of the Church of England. Nutter, *Hymn Studies* (New York, 1884, 3d ed, 1902), based on the American *Methodist Hymnal*, Burrage, *Baptist Hymn Writers and their Hymns* (Portland, Me, 1888), Tillet, *Our Hymns and their Authors* (Nashville, Tenn, 1889), the annotated edition of the *Hymnal* of the Methodist Episcopal Church South, Robinson, *Annotations upon Popular Hymns* (New York, 1893), based on his *Laudes Domini*, Stevenson, *The [British] Methodist Hymn-Book*, illustrated (London, 1883), from which S W Duffield drew many of the facts and anecdotes given in his *English Hymns* (New York, 1886), intended as a commentary on Robinson's *Laudes Domini*, Price, *Music and Hymnody of the Methodist Hymnal* (ib, 1911), *Hymns and Hymn Writers of the Church* (ib, 1911). The best anthologies of religious lyric poetry are *The Book of Praise* (London, 1862, many subsequent editions), by Sir Roundell Palmer (Lord Selborne), and F T Palgrave, *The Treasury of Sacred Song* (ib, 1889). See HYMN TUNES.

HYMNS. See HYMNOLOGY.

HYMNS, NATIONAL. See NATIONAL HYMNS.

HYMN TUNES. The authentic history of hymn tunes begins with Hilary of Poitiers, who died in 368. His music was simpler than that of the ordinary jublations, each syllable of the text being given but one or, at the most, two musical tones. St Ambrose (died 397) and, later, Pope Gregory the Great (died 604) introduced radical reforms in the style and singing of hymns (see AMBROSIAN CHANT, GREGORIAN CHANT), and the impetus given by them to the plain chant (qv) carried that form along for centuries. It is noteworthy that even so early in many cases the author of the words also wrote the accompanying melodies. With the growth of polyphonic music these old chants were used as *canti fermi* upon which the more elaborate forms of masses and motets were constructed. Under Palestrina (qv, died 1594) the polyphonic hymn reached its highest development. Around the historic plain chants he embroidered a wealth of contrapuntal devices, yet preserving throughout their original smoothness and beauty. The difficulty of the music is the one objection against their more general use.

Meanwhile a reaction had arisen against the heavy, sombre music which had heretofore been the sole style of hymn tunes. Between the acts of Mystery Plays, and especially at those given at Christmas time, it was customary to sing songs whose general trend was religious, but whose music was light and popular. The Reformation was imminent, and Luther appreciated and seized the opportunity for an innovation in Church music. He adapted some of these popular tunes to German translations of Latin hymns, wrote some original words, and

the whole was set for four, five, or six voices by Johannes Walther. Most important in this connection is the fact that for the first time in the history of hymn tunes the music was rhythmic. This was the beginning of the chorale (qv), which became immediately and widely popular. The next great period in Germany begins with Johann Sebastian Bach (1685-1750), who, while emphasizing the rhythmic element, at the same time developed the structural side of the music. After him the decline was rapid.

In France Clément Marot (died 1544) and Theodore Beza (died 1605) wrote metrical psalms which were set to popular music. Goudimel (1505-72), the earliest national composer, wrote many hymn tunes, but then difficulty rendered negative their excellence, and they were supplanted by the simpler arrangements of Claudin le Jeune (died 1600). Of the later French hymn writers the most important was Cesar Malan, of Geneva (1787-1864), who composed melodies to his own words. In England the history of hymn tunes follows much the same line as on the Continent. There were no hymns proper until the eighteenth century, before that time Tallis (died 1585), Byrd (died 1623), Parsons (died 1570), etc., set psalms to revised forms of old Continental tunes, and in 1621 "the Whole Booke of Psalmes" was published. The music of this edition was arranged largely by Thomas Ravenscroft, the tunes having been set by Bennet, Morley, Tallis, etc. With Orlando Gibbons (1583-1625) the polyphonic school in England came to an end, and the later compositions of Carey (died 1743), Wainwright (1792-1854), and their successors were poor in comparison. The reforms of the Commonwealth did nothing for Church music, and it was not until Purcell (1658-95), the greatest native English composer, that a lighter, more varied note was introduced into hymn tunes. The hymns of Watts (1674-1748) marked the beginning of the popular epoch, and those of Charles Wesley (1707-88) its high-water mark. In recent years choral music and hymn tunes have drawn more closely together, to the immeasurable advantage of the latter. In England especially, Dykes (1823-76), Barnby (1838-96), Stainer (1840-), and others have all written excellent music. At the same time, however, many hymns have been written in England and the United States whose music depends wholly for its success on its catchy, not to say vulgar, character. Most representative of this class are the hymns of Moody and Sankey. Of the many collections of tunes compiled since the middle of the nineteenth century, especially in England, the most notable is that published in 1861 by the Rev. Sir Henry Baker under the title *Hymns Ancient and Modern*. Revised and enlarged editions appeared in 1868, 1875, 1889, 1904, and 1910. For a more detailed account of hymn tunes, consult Butterworth, *Story of the Tunes* (New York, 1890), Love, *Scottish Church Music* (London, 1891), Curwen, *Studies in Worship Music* (ib, 1894), Cowan and Love, *Music of the Church, Hymnary and Psalter in Metre, its Sources and Composers* (ib, 1901), Mees, *Choirs and Choral Music* (New York, 1901), Dickinson, *Music in the History of the Western Church* (ib, 1902), E. S. Lorenz, *Practical Church Music* (ib, 1909), P. C. Lutkin, *Music in the Church* (Milwaukee, 1910). See also HYMNOLOGY.

HYNDMAN, HENRY MATERS (1842-) An English journalist and Socialist leader, born in London. He graduated at Trinity College, Cambridge, and began to study law in 1863, but three years later, as correspondent for the *Pall Mall Gazette*, went to the war in progress between Austria and Italy, where he became the friend of Mazzini, Garibaldi, and other patriots. Between 1869 and 1871 he traveled in Australia, New Zealand, and Polynesia, and while in Melbourne wrote articles for the *Argus* in the cause of free education. He founded the Social Democratic Federation in 1881 and from that time was a conspicuous reform agitator. He was chairman at the International Socialist Congress held in London in 1896 and assisted at the formation of the new International at Paris in 1900. He was an Irish land leaguer and a pro-Boer during the second Boer War. From 1900 to 1910 he was a member of the International Socialist Bureau, and he contested Burnley in 1895, 1906, and 1910. From 1874 he used his pen diligently in the Socialistic cause. His books include *Indian Policy and English Justice* (1874), *Bankruptcy of India* (1886), *England for All* (1881), *Historical Basis of Socialism* (1883), *A Commune for London* (1888), *Commercial Crisis of the Nineteenth Century* (1892, 3d ed., 1908), *Economics of Socialism* (1896), *The Record of an Adventurous Life* (1911), *Further Reminiscences* (1912).

HYOGO, hyō'gō. A part of the Japanese town of Kobe (qv).

HYOID BONE (from Gk ὑοειδής, *hyoeidēs*, shaped like the Greek letter upsilon, from ὕ, *y*, upsilon + εἶδος, *eidos*, shape). The tongue bone, or V-shaped bone. It is sometimes spoken of as unimportant in man, compared with the so-called hyoid bone in many of the lower animals, in which, on account of its being a support for bronchial apparatus, it is often developed to a great size. But its importance is no less in man, because of its connection with many muscles, the perfection of its form and its exact location at the base of the tongue being a considerable element in the apparatus for the formation of articulate and musical sounds.

HYOLITHES, hī-ōl'i-thēs (Neo-Lat nom pl from Gk ὕ, *y*, upsilon + λίθος, *lithos*, stone). An important and common fossil of the Cambrian rocks, and found also, though less commonly, in the higher rocks up to and including those of the Permian system. The shells of this mollusk are slender, conical tubes, often curved, and with triangular or flattened cross sections. Some are provided with a lid to close the aperture. The old genus *Hyolithes* has been elevated to a family rank, and the numerous species have been distributed among several new genera. The hyolithids are very common in many of the Lower Cambrian rocks, and they are indeed among the very oldest fossils known. They have been classed as pteropods, and more recently as worm tubes, with the probabilities in favor of the latter relation. Some authors have also considered the hyolithids to represent quite nearly the most primitive form of gastropod. Consult Novak, "Revision der paläozoischen Hyolithiden Bohmens," in *Abhandlungen der böhmischen Gesellschaft der Wissenschaften*, series 7, vol. 14 (Prague, 1891), Holm, "Sveriges Kambrisk-Siluriska Hyolithida och Conulariidae," in *Afhandlingar Sveriges Geologiska Undersökning*, series C, no

112 (Stockholm, 1893), Walcott, "Fauna of the Lower Cambrian or Olenellus Zone," in *Annual Report of the United States Geological Survey*, vol. x (Washington, 1893), Matthew, "Illustrations of the Fauna of the St. John Group," in *Transactions of the Royal Society of Canada*, vols. 1 to v (Montreal, 1883-91)

HYOSCYAMINE, hī'ō-sī'a-mīn See ALKALOIDS

HY'OSCY'AMUS See HENBANE, BELLADONNA

HYPÆTHRAL, hīp-ē'thral, **HYPÆTHROS**, hīp-ē'thros (open to the sky, a structure open to the sky) A term applied by Vitruvius (iii, 1) to a temple with a central unroofed space See TEMPLE

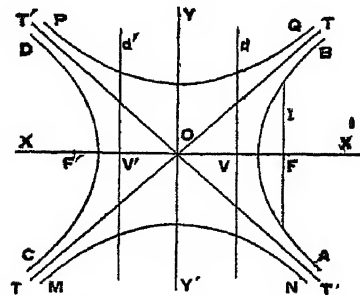
HYPATIA, hī-pā'shī-a (Lat. from Gk. *Ἥπαρια*) Daughter of Theon, an astronomer and mathematician of Alexandria and head of the Neoplatonic school in that city, early in the fifth century. She is famed alike for her beauty, her purity, her wisdom, and her tragic fate. Her father gave her the best training the philosophy of the time could furnish, and she succeeded him as lecturer at Alexandria, her fame drew students from all parts of the East, where the influence of Greek thought and knowledge was felt. The citizens of Alexandria were proud of her, and such reliance was placed upon her judgment and sagacity that the magistrates used to consult her on important cases. Among those who were most intimate with her was Orestes, prefect of the city. At this time the Bishop of Alexandria was Cyril (qv), between whom and Orestes there had arisen a dissension on the question of jurisdiction. "It was commonly reported among the Christians," says Socrates, the Church historian, "that it was by her influence he [Orestes] was prevented from being reconciled with Cyril. Some of them, therefore, whose ringleader was a reader named Peter, hurried away by a fierce and bigoted zeal, entered into a conspiracy against her, and observing her as she returned home in a carriage, they dragged her from it and carried her to a church called Caesareum, where they completely stripped her and then murdered her with shells. After tearing her body to pieces, they took her mangled limbs to a place called Cynaron, and there burned them." This occurred in March, 415. As at the time Synesius (qv) met her (about 395) she had been for 20 years a famous lecturer, and as she lived 20 years after that, she must have been at least 60 years old when murdered, but in legend and fiction she is represented as of unfaded physical charm. She is the heroine of Charles Kingsley's *Hypatia, or New Foes with an Old Face* (1853). Synesius has preserved a few of her letters. Consult Meyer, *Hypatia von Alexandria, ein Beitrag zur Geschichte des Neuplatonismus* (Heidelberg, 1886), and J. B. Bury, *History of the Later Roman Empire*, vol. 1 (New York, 1889).

HYPERÆMIA See BIER'S HYPERÆMIA, MEGRIMS

HYPÆSTHESIA (Neo-Lat. from Gk. *ὑπέρ*, *hyper*, over + *αἰσθησις*, *aisthēsis*, sensibility, from *αἰσθάνεσθαι*, *aisthanesthai*, to perceive through the senses) and **HYPERALGESIA** "Hyperæsthesia" is a term commonly though less correctly used to designate increased sensibility to pain, the proper term being "hyperalgesia." It is believed that there is no increase of sensibility to touch or to heat and cold over

the normal, though tactile and thermal sensibility may be diminished under various conditions. Unpleasant sensation or actual pain may be caused by a light touch on the surface and is due to irritation of oversensitive end organs of common sensibility (i.e., pain) and not to increased perception of touch. Hyperalgesia is due to peripheral, spinal, or cerebral irritation of sensory nerve fibres. Increased cutaneous sensibility occurs in meningitis, cerebral or spinal, tetanus, hysteria, traumatic neuroses, hydrophobia, in neuritis and multiple neuritis, and in some fevers. Local hyperalgesia occurs in inflamed areas, as around carbuncles, burns, or rheumatic joints. See ANÆSTHESIA

HYPERBOLA (Gk. *ὑπερβολή*, *hyperbolē*, hyperbola, excess, from *ὑπερβάλλειν*, *hyperballein*, to exceed, from *ὑπέρ*, *hyper*, over + *βάλλειν*, *ballein*, to throw) One of the conic sections (qv). Analytically the hyperbola is the locus of a point which moves so that its distance from a fixed point, called the focus, bears a constant ratio greater than unity to its distance from a fixed straight line, called the directrix. In the figure *F* is the focus and *d* the directrix for the branch on the right, *F'* is the focus and *d'* the directrix for the branch on the left, *XY* is the transverse axis, *Y'Y* the conjugate axis, and *l* is the latus rectum. The equation of the hyperbola referred to the rectangular axes *XX'*, *YY'* is $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, in which *a* = *OV*, and *e* is the given ratio. Since *e* > 1, *a*²(1 - *e*²) is negative. Putting -*b*² for this negative quantity, the standard form of the equation is $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$. The curve *MN*, *PQ* is the conjugate hyperbola with respect to the hyperbola *AB*, *CD*. (See CONJUGATE) The hyperbola is



HYPERBOLA

the only conic section having real asymptotes. These are the lines *TT*, *T'T'* in the figure. The equation of the hyperbola referred to its asymptotes is *xy* = *ab*. A hyperbola whose asymptotes are perpendicular to each other is called a *rectangular* or *equilateral* hyperbola. These asymptotes have the following remarkable property. If, starting from *O*, the asymptotes are divided in continued proportion, and from the points of section lines are drawn parallel to the other asymptote, the areas contained by two adjacent parallels and the corresponding parts of the asymptote and curve are equal.

HYPERBOLE, hī-pēr'bō-lē The name given to a figure of rhetoric by which expressions are employed that, taken literally, signify more than is really meant. The use of the figure is to arrest the attention. Hyperbole is the basis

of many metaphors. Thus, we call Nero a monster, Tamerlane a tiger, and so on. See RHETORIC, FIGURES OF.

HYPERBOLIC LOGARITHMS. See LOGARITHM.

HYPERBOREANS (Gk *ὑπερβόρειοι*, *Hyperboreoi*, beyond the north wind, from *ὑπέρ*, *hyper*, above, beyond + *βορέας*, *boreas*, north wind). A name given by the ancients to a mythical people dwelling in the distant north, beyond the Rhipæan Mountains, where it was everlasting day and perpetual spring, and where sorrow and old age were never found. The name was often applied to any people who lived in the Far North. The Hyperboreans may have been originally those who brought to Apollo gifts and sacrifice. Consult Crusius, "Hyperboreer," in Roscher, *Lexikon der griechischen und römischen Mythologie*, vol. 1 (Leipzig, 1884-90), Mannhardt, *Wald- und Feldkulte* (1905), Farnell, *Cults of the Greek States*, vol. iv, 100 ff (London, 1907). For an ancient discussion, skeptical in tone, of the myth of the Hyperboreans, consult Herodotus, iv, 32 ff, and the notes on the passage in the edition of Herodotus by How and Wells (Oxford, 1912).

HYPERCALVINISM. That form of Calvinism which carries the system to its extreme logical conclusions, holding, e.g., to a double predestination (to evil as well as good), as in the Canons of Dort, and atonement only for the elect, as in the Second Helvetic Confession. Consult Schaff, *Creeds of Christendom* (New York, 1881).

HYPERCHIMÆRA, hī'pēr-ki-mē'ra. A term applied to a plant produced by the union of two others by grafting in such a manner that portions of each are aggregated into a sort of patchwork or mosaic. As it is a sort of graft hybrid, it is discussed under GRAFT HYBRIDS and CHIMÆRA, IN PLANTS (qqv).

HYPERÆMIA. See HYPÆMIA.

HYPERGEOMETRY. See GEOMETRY, *Hypergeometry*.

HYPERIDES (Lat, from Gk *ὑπερίδης*, *Hyperidēs*). An Athenian orator of the fourth century B.C., one of the 10 comprised in the Alexandrian canon (See CANON ALEXANDRINUS). After studying philosophy under Plato and oratory under Isocrates, he began his public career as an advocate in the Athenian courts of justice and joined the patriotic party, at that time led by Demosthenes and Lycurgus. He fitted out two triremes at his own expense for the Eubæan expedition of 358 B.C. In 338 B.C., when the disastrous fight of Chæronea (qv) laid Greece at the mercy of Philip of Macedon, Hyperides proposed that the citizens should send their wives and children to places of security and fight it out to the last. Though this desperate advice was not taken, its genuine patriotism was appreciated and rewarded by his countrymen. When the death of Philip revived the hopes of the anti-Macedonian faction, Hyperides promoted the alliance with Thebes, and after the destruction of that city by Alexander was one of the orators demanded of the Athenians by the Macedonian King. Alexander, however, did not press his demand, and Hyperides continued to oppose the Macedonian influence as strongly as ever. The arrival in Athens of Harpalus (qv), the runaway treasurer of Alexander, then absent on his Eastern conquests, disturbed the friendly relation that had hitherto existed between Hyperides and Demosthenes, for

in this celebrated case Hyperides, as one of the few anti-Macedonians who were above suspicion, was chosen to prosecute his friend (See DEMOSTHENES). In the Lamian War (qv), which followed the death of Alexander, Hyperides took a leading part, and he spoke the funeral oration over his countrymen who had perished in battle. The year 322 B.C. saw the hopes of Athens finally crushed at the battle of Crannon. The chiefs of the patriotic party sought safety in flight. Hyperides was overtaken at Ægina by the agents of Antipater and put to death. Tradition says that his tongue was torn out by his captors, or that he bit it out to avoid betraying his friends. As an orator, Hyperides was ranked high by the ancients, it is said that some critics preferred him to Demosthenes. The "grace" of his speeches was especially praised. The writer of the *Lives of the Ten Orators* enumerates 75 speeches, of which 52 were considered genuine. Until recently these were known only in scanty fragments, but in the last century a number of papyri were discovered in Egypt which contain six speeches in a fairly complete state, including the famous funeral oration mentioned above. This fully justifies the praise of the ancient critics and may be ranked as one of the finest products of Greek oratory. A complete edition of the speeches and fragments, with bibliography, has been published by Blass (Leipzig, 1894). The orations *Against Athenogenes* and *Against Philippides* have been edited, with an English translation, by Kenyon (London, 1893). Consult Jebb, *Attic Orators*, vol. ii (London, 1880), Blass, *Attische Beredsamkeit*, vol. iii (Leipzig, 1893), Wright, *A Short History of Greek Literature* (New York, 1907), Christ-Schmid, *Geschichte der griechischen Literatur*, vol. 1 (5th ed., Munich, 1908).

HYPERION. See TITANS.

HYPERION. 1 A poetic fragment by John Keats (1820). 2 A romance by Longfellow, published in 1839.

HYPERIUS, ANDREAS GERHARD (1511-64). A Protestant theologian and reformer, born at Ypres, whence his learned name Hyperius, Gerhard being his family name. He was educated at the University of Paris and traveled in the Netherlands and in Germany. Driven from England (where he lived four years with William Mountjoy, Erasmus' friend) by the persecutions of 1540, he went to Germany, was converted to Protestantism, and became professor of theology at Marburg. A deep scholar and a liberal theologian, he was accused of Zwinglian views on the Lord's Supper. He wrote *Methodi Theologiæ Libri III* (1566), *De Formandis Conciombus Sacris* (1553), *De Recte Formando Theologiæ Studio* (1556), the first scientific dictionary of theology.

HYPERMETAMORPHOSIS. Set METAMORPHOSIS.

HYPERMETROPIA. See SIGHT, DEFECTS OF.

HYPERMNES'TRA (Lat, from Gk *ὑπερμνήστρα*). One of the Danaids. She alone of the daughters of Danaus (qv) disobeyed his command, she did not slay her husband, Lynceus, but was eventually pardoned by her father.

HYPEROPIA (from Gk *ὑπέρ*, *hyper*, above + *ὄψις*, *opsis*, sight). A congenital or acquired error of refraction of the eye. Owing to too little convexity of the refracting surfaces, parallel rays of light do not converge to a focus on the retina, as in the normal eye, but to a

point somewhere behind the same. It is usually called hypermetopia, long-sightedness, and is the opposite of myopia.

HYPERSPACE See GEOMETRY

HYPERSTHENE (from Gk *ὑπέρ*, *hyper*, over + *σθένος*, *sthenos*, strength) An iron-magnesium silicate, classed in the orthorhombic section of the pyroxene group. With a decreasing proportion of iron hypsthene grades into enstatite (qv). It crystallizes in orthorhombic forms, but is also found in granular masses. Associated with labradorite and other basic feldspars, it is an important constituent of certain eruptive rocks, such as gabbro and norite, and is widely distributed. When cherry red in color, it may be cut and polished and used as an ornamental stone.

HYPERSTHENE GABBRO See GABBRO

HYPER/TROPHY (from Gk *ὑπέρ*, *hyper*, over + *τροφή*, *trōphē*, nourishment, from *τρέφειν*, *trēphein*, to nourish) The term applied in medicine to the abnormal and disproportionate enlargement of any part of the body. Examples of this change are seen in the muscular system, where it may occur altogether independently of disease. The huge bosses of flesh that stand prominently forward in the arm of a blacksmith or of a pugilist and in the leg of a ballet dancer are illustrations of hypertrophy from increased use, where the general health may be perfect. In double organs, such as the kidneys and lungs, if the organ on one side degenerates through disease, the organ on the opposite side is often found to enlarge and carry on double work. In these cases hypertrophy is an effect of disease, but is at the same time a preservative of life. It is called compensatory hypertrophy.

There are, however, cases in which the hypertrophy has a hurtful instead of a conservative effect, as, e.g., hypertrophy of the thyroid gland, constituting the disease known as goitre, or bronchocele, hypertrophy of the prostate gland, of the spleen, etc. The following are the etiological factors of hypertrophy: 1 It may be congenital. 2 A local increase in the supply of blood to a part, whether due to increased exercise, or irritation by mechanical or chemical agents, etc. 3 It may be due to old age—the so-called senile hypertrophy, the commonest example of which is the enlargement of the prostate gland in old men, which is said to occur in about 40 per cent of all men after the age of 50 years. 4 Syphilis and chronic inflammations are also very common causes of hypertrophy. See HEART, DISEASES OF THE

HYPHA (Neo-Lat nom pl, from Gk *ὕφη*, *huphē*, web) An individual filament of the body of a true fungus. The vegetative body of a true fungus is called a mycelium, which consists of a web of filaments (usually colorless) which is of various textures, dependent upon the closeness of the weaving. A mycelium may be as delicate as a cobweb, or it may be as compact as a piece of felt. Each individual thread or filament of this woven body is a hypha. Hyphæ constitute not merely the units of structure of the fungus body, but they also arise from the mycelium to bear spores, and they also enter the substratum to secure nutrition. See FUNGI

HYPNAL (from Gk *ὑπναλός*, *hypnaleos*, causing sleep, from *ὑπνος*, *hypnos*, sleep, connected with Lat *somnus*, *sopor*, AS *swefen*, Skt *svapna*, sleep, from *svap*, to sleep) A

hypnotic of value, combining the effects of chloral hydrate and antipyrine, of which it is composed. Its chief use is found in cases of sleeplessness due to pain.

HYPNOS (Lat, from Gk *ὕπνος*). The Greek god of sleep, the son of Erebus and Night, and twin brother of Death. He is represented as a youth with wings, bearing a poppy branch and the horn of slumber.

HYPNOSCOPE (from Gk *ὑπνος*, *hypnos*, sleep + *σκοπεῖν*, *skopein*, to view) A magnet devised to measure hypnotic sensitiveness. The magnet is a slit tube 3.4 centimeters in diameter by 5.5 in length and weighs 169 grams. It is very powerful, lifting 25 times its own weight. The instrument is applied by removing the armature and inserting the forefinger of the person to be tested into the magnet so as to touch both poles at once. After two minutes sensitive or objective effects will be noticed in 30 per cent of persons tested. It is not an instrument of any value whatever. Hypnotic influences cannot be measured by any known mode at the present time.

HYPNOTICS (from Lat *hypnoticus*, Gk *ὑπνωτικός*, *hypnotikos*, relating to sleep, from *ὑπνος*, *hypnos*, sleep) Agents which are used to induce sleep. During the state of slumber, especially if deep, the functional activity of the cerebral centres is largely suspended. Medullary centres remain active, but are less alert. The brain and spinal cord are anæmic, reflex action is diminished, and the senses are dulled. The ordinary precautions of one about to sleep—the recumbent position, the darkened and quiet room, the absence of previous excitement—are simply evidences of physiological necessity. Hypnotics act ordinarily by diminishing the functional activity of the brain or by causing an anæmia of it, occasionally by both methods. They may be divided into four classes.

(A) *Mental*, acting by diminishing the functional activity of the cerebrum. This class includes the constant repetition of prayers, etc., the counting up into the hundreds or thousands, the counting imaginary sheep as they jump an imaginary wall, and many similar expedients. These are only of value in light grades of insomnia.

(B) *Dietetic*. This class causes a congestion of the abdominal viscera by increasing their functional activity and thus leads indirectly to cerebral anæmia. A light supper of crackers and cheese, or oysters, or soup, or beef tea, is often of great value for inducing sleep. Frequently the addition of a little alcohol as a weak toddy, or a bottle of beer, will help.

(C) *Mechanical*, including 1 *Hot-Water Bag* or *Brick* to the feet, of value when the extremities are cold. It acts by indirectly causing cerebral anæmia. 2 *Moist warmth* to abdomen by a poultice or hot compress covered with oil silk. This is frequently of value. It acts by dilating the abdominal vessels, and thus causes cerebral anæmia. 3 *Hot Bath*. This acts by dilating the cutaneous vessels and thus causing cerebral anæmia. Certain precautions should be observed. The bed should be well warmed, and the room moderately cool. The bath should be hot, and the individual should stay in it for several minutes. He should be dried as quickly as possible, and in passing from the bath to the bed he should be well wrapped up and wear warm slippers. This method is often of great value when properly applied. It should be used with caution in cases of heart disease. 4.

Chapman's Method. This consists in the application of cold to the spine. It indirectly causes dilatation of the abdominal vessels and thus cerebral anæmia. 5 *Massage.* This should be general and thorough, especially to the abdomen. It acts by dilating the vessels of the body and also by lessening the irritability of the sensory cutaneous nerves. If the ordinary precautions of quiet and darkness are observed after the massage, this method frequently acts very well. All the preceding measures are of little value in case any acute disease is present. In such cases, and many others, we have to resort to drugs. These should not be used for ordinary insomnia until a thorough trial has been given to the dietetic and mechanical hypnotics. None should be given except under the advice of a physician who has examined the patient. They are, of course, grouped under the class (D) *Medicinal*. 1 *Opium* and its derivatives. As simple hypnotics, these are all objectionable, for they produce other marked effects than sleep. The danger of a habit forming must also be considered. In acute diseases, especially when accompanied by pain or delirium, they are of great value. Codein is the least objectionable, but it is also the most expensive and the least efficacious. 2 *Hyoscyamus* and its derivatives. These are not of so much value as are ordinary hypnotics, for they cause other marked effects. In cases of mania they are of great value. Hyoscyne hydrobromate has the most decided hypnotic action. 3 *Cannabis Indica.* Feeble in hypnotic power. The sleep produced by it is apt to be preceded by delusions often unpleasant. 4 *Chloral Hydrate.* This is a very valuable hypnotic. It has some objections. A very important one is the tendency to the formation of a habit. Another is the difference in susceptibility to its action. Chloral hydrate is a powerful cardiac depressant, and in cases of heart disease or heart weakness from any cause it should be used with great caution, if at all. A small dose has caused death, although 50 and 60 grains have been given in other cases without harm. 5 *Bromides.* These are not very powerful hypnotics, but are still very efficacious and comparatively harmless. Potassium bromide is the most useful, but sodium bromide, though less active, is not so depressing to the circulation. 6 *Monobromated Camphor.* A feeble hypnotic. 7 *Paraldehyde,* a polymeric modification of acetic aldehyde. This is an efficient hypnotic, producing sleep, as a rule, in half an hour. As regards its nervous effects, it is almost a pure hypnotic, and it causes but slight depression of the heart and respiration. It leaves no after effects except the odor of the breath, which is often very marked, and it may cause nausea or vomiting if the stomach is very irritable. Like all hypnotics, it sometimes fails. 8 *Sulfonal.* This is an efficient but slow-acting hypnotic. The dose is given one or two hours before the expected sleeping time. 9, 10 *Trional* and *Tetional* are similar drugs, with more rapid and powerful action. The three last named may produce poisoning if used for any length of time or in too large doses. 11 *Urethane,* ethyl carbonate, $C_2H_5CO_2NH_2$, has a bitter, disagreeable taste. This is an efficient hypnotic, leaving no disagreeable after effects. In large doses it may cause vomiting, but is otherwise a pure hypnotic. It has no depressing action on the heart or respiration. 12 *Amylene Hydrate.* A colorless fluid with a sharp taste

and smell. This is an efficient hypnotic, causing sleep in 15 to 45 minutes. The sleep is natural, and there are no bad after effects. It has no depressing effects on the heart or respiration. It has caused in a few cases a delirium resembling that of alcoholic intoxication, but followed by refreshing sleep. 13 *Amylene Chloral,* or *dormiol,* is similar in action. 14 *Veronal,* a later production, has in a large measure superseded many of the older hypnotics. It is claimed to be the safest and least apt to induce a habit, but not a few cases of poisoning have been reported, as well as of habit formation. Most of the drugs named are considered in special articles under their names.

HYPNOTISM, HYPNOSIS (from Gk *ὑπνος, hypnos,* sleep). The general names for a group of abnormal phenomena, physical and psychical, which show a close outward resemblance to the phenomena of normal sleep and of sleep walking. The symptoms of the hypnotic state differ considerably among different subjects, and the making off of distinct stages within this state is rather a matter of theory than of actual observation. The artificial sleep is continuous and progressive, beginning with a languor and drowsiness not unlike those of a man suddenly waked from sound sleep, or arousing from a too protracted morning's nap after a disturbed night. As the state advances, the subject becomes partially anæsthetic, insensitive to pin pricks, pinching of the skin, etc., his sense organs are closed to most of the impressions from his surroundings that would normally excite them, if awakened before the sleep has grown more profound, he remembers hazily what has occurred during hypnosis. He is extremely suggestible at the hands of those who, as he thinks, have induced the sleep and will execute movements that the experimenter prescribes to him. The voluntary muscular system evinces a curious rigidity and fixity, the subject will remain in any position in which he is placed. This feature has given the name of "catalepsy" (seizure) to the stage in question. As the sleep is continued, the subject becomes still more anæsthetic, until consciousness seems to lapse altogether, on waking, he has no memory whatsoever of the hypnotic period. The name of "somnambulism" is given to a stage of profound hypnosis in which illusions are produced at the experimenter's suggestion: the subject takes ink for wine, a pillow for a baby, steps carefully over an imaginary book, etc.

These phenomena of sleep or trance, mixed with much that is simply charlatanry, have been discussed and exploited from time immemorial. The medicine men of primitive and savage tribes, the magicians of Egypt and Chaldaea, the Hindu ascetics, the monks of Mount Athos, the quack physicians of all ages, have made use of hypnotism to enhance their personal prestige, to cure the sick, or to induce states of religious ecstasy. The modern history of hypnotism begins with F. A. Mesmer (1733-1815), a German physician who practiced hypnotic therapeutics at Paris from 1778, causing so great a stir in scientific circles that his pretensions were made a matter of inquiry by a royal commission (1785). The report of the commission was unfavorable, but "mesmerism" still flourished. In England valuable works were published in the early forties by J. Braid, a Manchester surgeon (c. 1795-1860), but their sanity and importance have but recently been fully recognized. Braid coined

the word "neurohypnotism," or nerve sleep, from which comes the modern word "hypnotism." During the last third of the nineteenth century the facts of hypnosis were thoroughly investigated by physiologists and psychologists Heidenhain and Preyer in Germany, Richet, Charcot, Liebauit, and Bernheim in France, Delboeuf in Belgium, confirmed and extended Braid's results. The French investigators split into two distinct "schools"—that of Charcot and his followers at the Paris Hospital of the Salpêtrière, and that of Bernheim and his followers at Nancy. The Salpêtrière school maintains that hypnotism is a pathological phenomenon, akin to hysteria, and characterized by three well-marked stages, the school of Nancy asserts that it can be set up in the normal individual, that it is a unitary and progressive state, and that the key to its understanding is given with the facts of suggestion. The latter views have found general acceptance, but the controversy undoubtedly hindered the advance of knowledge and threw discredit upon the whole subject. It need hardly be said that the doctrines known as animal magnetism, electrobiology, odism or odyism, mesmeric clairvoyance, etc., are one and all—save in so far as they cover the facts of hypnotism proper—fanciful and ungrounded hypotheses.

In considering the psychology of the hypnotic state we have first to notice that its sole and essential condition is an exaggerated state of passive attention to some object or person. (See ATTENTION.) In popular phraseology there is a "total surrender of the will" of the subject, either to a sense impression or to the experimenter's personality. The condition of hypnosis thus lies—and this fact is of extreme importance—in the mind of the subject himself, the experimenter or "operator" has no power, except as the subject gives him power. The reason that the professional hypnotist and the physician are accredited with a special ability to induce hypnosis is, first, that they "suggest" to the inquirer—whether consciously, by strongly worded advertisement, or unconsciously, by the mere authority of position—that such ability resides in them, and, secondly, that they acquire, in the course of their experience, a tact or insight concerning the best means of bringing the inquirer into the necessary attentive state. The subject comes to them prepared for hypnotization, and they make conditions easy for its attainment. Further than this the ability of the operator does not extend. It is, indeed, entirely possible to hypnotize oneself. (See AUTOSUGGESTION.) Most of us have at times "let ourselves go" mentally, until we were on the verge of what seemed to be a kind of fascination or trance, at the brink of which we aroused ourselves with a start. If now we place ourselves under circumstances favorable to sleep, cutting off, so far as may be, external impressions, and attend concentratedly to the idea of hypnosis, we presently drop into a similar state of "fascination," which soon becomes hypnosis proper and later passes off as ordinary sleep.

We notice, secondly, as a corollary to what has just been said, that all persons of normal constitution are hypnotizable. Hypnosis is "abnormal" only in the sense in which dreaming (qv) is abnormal, and as we are all liable, though in varying degree, to dreams, so are all normal minds liable to hypnotization. The

strong-minded person who declares that So-and-so tried to hypnotize him, but could not on account of his vigorous resistance, makes a ludicrous misstatement. It is not So-and-so who is to hypnotize him, but he himself, and incapacity for hypnosis is not the mark of a strong, but of a weak mind. Hypnosis (and this is a difference between it and dreaming) is impossible in the case of idiots and of very young children, because they are scatter-brained, unable to attend fixedly and continuously, the more "powerful the will," the easier must hypnosis be. We see this, indeed, in the tendency of vigorous minds to "brown study," a state nearly related to hypnosis, and characterized by the same single-hearted absorption and the same arrest of bodily movement. Whether or not animals can be hypnotized is a disputed question. In the emotion of extreme fear (when, if ever, the animal mind must be dominated by one sole idea, and so approach to the requisite degree of passive attention), we have a muscular rigidity, known as "catalepsy" (cf. the popular word "stroke"), which outwardly resembles the stage of catalepsy in man. Seize a frog firmly by a hind leg, and the animal will spread out, stiff and stark, making no effort to escape. Pigeons, fowls, guinea pigs, etc., can all be readily "hypnotized" by similar means. The trend of expert opinion seems, however, to be that the resemblance to hypnosis is rather external than real.

We turn now to some special questions of hypnosis, and first (1) to that of the *rapport*. This is a supposed subjective link or bond whereby the experimenter, in virtue of his will power or personal magnetism, attaches the subject to himself. Now it is true that there are cases in which a subject can be "hypnotized" only if a certain operator or experimenter allows or commands it. But there is nothing mysterious, still less supernatural, in the matter. The subject in some way (perhaps by self-suggestion, perhaps at the explicit suggestion of a physician) acquires the insistent belief that hypnosis is impossible for him without the presence or assent of the experimenter, and the belief, once acquired, is effective. It is thus the subject, again, whose "will" is concerned, not the operator. The *rapport* is sometimes suggested by physician to patient, in order to prevent interference by outsiders with the conduct of a case, and thus serves a useful purpose. 2. It may be suggested to a somnambulistic subject that at such-and-such a time after waking from the hypnotic sleep he shall perform such-and-such an action. This is termed *posthypnotic* or *terminal* suggestion. Its effectiveness depends upon the fact that the time idea is common both to the hypnotic and to the waking consciousnesses and so forms a bridge between the abnormal and the normal states. "You will go into the kitchen and drink a glass of water at five o'clock." The subject is strongly impressed by the five-o'clock idea. When, therefore, five o'clock actually comes, its perception or idea is sufficient to throw him into the first stage of hypnosis, the suggestion recovers its hypnotic strength, and he goes passively to execute the prescribed act. 3. Although the somnambulist remembers nothing of the hypnotic state from which he is aroused, he may, if rehypnotized, recall what took place during his previous sleep. Memory is thus continued from one hypnotic consciousness to another, as it is from one

waking consciousness to another, but there is no continuity of memory from sleep to waking, or conversely. This fact has given occasion to various theories of double consciousness (qv) —quite unnecessarily, for it is adequately explained by the known laws of memory. We remember only when we have a cue to memory, when our present circumstances "suggest" the past. When eating a good dinner after a long walk, we recall other good dinners eaten in like circumstances; we do not recall such dinners when there is nothing to remind us of them. But the waking state, with all the sudden inrush of stimulations that it involves, is entirely different from the hypnotic state, there is nothing in the one (apart from the terminal suggestions just discussed) to remind us of the other, whereas there is everything in a present hypnotic state to revive our memories of foregone like states. Dreams, in the same way, are not seldom continued from night to night, though we forget all about them in the daytime. 4 Lastly, as regards the *therapeutic value* of hypnosis, we may say that as a "suggestion," in the waking life, may make us blush or cry, so the indefinitely stronger suggestions of the hypnotic state may bring about circulatory or secretory changes that are of benefit to the organism. Furthermore, hypnosis is frequently used by psychopathologists, in the treatment of hysteria and other neuropsychoses, to bring about a recall and consequent discharge of the forgotten complexes which are supposed to be responsible for the disorder (see HYSTERIA). But no command to get well can ever mend a broken bone or cure a typhoid patient. Moreover, there is always the danger of setting up an "hypnotic habit" or of breaking down the subject's self-reliance, in which event the remedy is worse than the disease. See FAITH CURE.

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HYPOBOLE, hī-pōb'ō-lē (Gk ὑποβολή, a throwing under, from ὑπό, *hypo*, under + βάλλειν, *ballein*, to throw). A figure of rhetoric, whereby each of several arguments that appeal to favor the side of ones opponent is introduced only to be refuted. See RHETORIC, FIGURES OF.

HYP'OCAUST (Lat *hypocaustum*, *hypocaustum*, from Gk. ὑπόκαυστον, vaulted room with furnace below, from ὑπό, *hypo*, under + καυστός, *kautos*, burned, from καίειν, *kainein*, to burn). An arrangement of hollow flooring for the distribution of heat in Roman houses and baths. Upon a lower flooring of concrete short brick pillars (*suspensurae*), about 2 feet apart in each direction, supported the large tiles of the upper flooring. Into the hollow space thus provided hot air from the furnace was discharged, and the smoke was led through passages partitioned

in the same space. The system was universal in the *thermae*, or baths, and sometimes in large houses, as in that of the Vestal Virgins at Rome. It was invented shortly before Augustus and is now coming again into use for heating the so-called "Turkish baths." It was an effective and agreeable mode of heating, but—except in baths, where the furnace was used to heat the water—enormously costly in fuel. It can be studied in all the details of its arrangement in the ruins of Roman houses and baths. See BATH.

HYPOCHLO'RITES. See HYPOCHLOROUS ACID.

HYPOCHLO'ROUS ACID, HClO. An acid that may be assumed to be formed when chlorine monoxide (Cl₂O) is dissolved in water. Chlorine monoxide, which decomposes into chlorine and oxygen with explosive violence, may be obtained by the action of dry red oxide of mercury upon chlorine. In aqueous solution chlorine monoxide is not explosive. The salts of hypochlorous acid are termed *hypochlorites*, and some of them are valuable bleaching agents. Ordinary bleaching powder is supposed to contain the hypochlorite of calcium, Javelle water contains the hypochlorite of potassium, Labarraque's solution contains the hypochlorite of sodium. Bleaching powder is made by the action of chlorine on lime, similarly the hypochlorite of potassium may be obtained by the action of chlorine upon a cold solution of caustic potash. If solutions of hypochlorites are heated, the corresponding *chlorides* and *chlorates* are formed. See BLEACHING POWDER.

HYPOCHÆRIS, hī-pō-kē'ris (Neo-Lat., from Gk ὑποχέρως, succory plant). A genus of plants of the family Compositæ, of which one species, *Hypochaeris radicata*, or long-rooted cat's-ear, is extremely common in meadows and pastures in Great Britain and other parts of Europe and introduced in the eastern part of the United States. Its leaves, which are all radical and spread on the ground, resemble in form those of the dandelion, but are rough, the stem is branched, the flowers somewhat similar to those of the dandelion, but smaller. Cattle eat this plant readily, and its abundance is not deemed injurious to pasture or fodder.

HYPOCHONDRIA, hī-pō-kōn'drī-a. See HYPOCHONDRIASIS.

HYPOCHONDRI'ASIS (Neo-Lat., from Lat *hypochondrium*, Gk ὑποχόνδριον, hypochondriac region, so called because of the supposed connection of the disease with this part of the body). A disease characterized by extreme increase of sensibility, palpitations, morbid feelings that simulate the greater part of diseases, exaggerated uneasiness, and anxiety, chiefly in what concerns the health, etc. In extreme cases it becomes a species of insanity. The disease is very frequently associated with disorder of the digestive functions.

When sombreness of disposition and anxiety concerning personal comfort become exaggerated, and attention is directed chiefly to the state of the health, it amounts to common hypochondriasis. When it passes beyond the control of the will, when the whole mind is directed to the state of the system or to particular organs and exalts and misinterprets sensations, the condition is designated hypochondriacal insanity. The disease may be described as the engrossment of the attention by false impressions conveyed, or conceived to be conveyed, from

internal organs These sensations may in many instances be real, and proceed from actual alterations in the structure or functions of the parts supposed to be affected, but they may likewise consist of ordinary sensations, excited and intensified by the act of attention which makes them known to the patient. Neither the experience nor the sufferings of the victims are imaginary, however absurd their errors, and however groundless their apprehensions may be the disease is real, and consists in the exaltation of sensibility and attention and in the delusions which originate in that morbid state. A man lives in constant fear of death, he is firmly convinced that he labors under cancer, consumption, disease of the heart, etc. Hypochondriasis is often a precursor of melancholia, or other kinds of alienation, but it must likewise be regarded as a distinct and independent affection, traceable generally to disorder of the digestive and assimilative apparatus, to sexual excess or other debilitating influences. Such patients always should be watched, for many of them commit suicide while temporarily under the influence of an hallucination or a delusion. Diversion, camp life, hunting, fishing, and other occupations should engross the patient's attention during an outdoor life, or travel should be his resource, always in the society of a lively, healthy companion. Drugs alone produce little benefit. Consult Falret, *De l'hypochondrie et du suicide* (Paris, 1822), Bucknill and Tuke, *Psychological Medicine* (London, 1879), C. A. Mercier, *Psychology, Normal and Morbid* (New York, 1902), Boris Sidis, *The Foundations of Normal and Abnormal Psychology* (Boston, 1914).

HYPOCOTYL (abbreviation of *hypocotyledonous*, from Gk *ὑπό*, *hypo*, under + *κοτυληδών*, *kotylēdōn*, cotyledon, from *κοτύλη*, *kotylē*, socket). In seed plants, the axis of the embryo below the cotyledons. This axis has been variously called radicle and caulicle, but, since it has peculiar structures and powers which do not belong to ordinary roots and stems, it has received a distinctive name. In general, the hypocotyl is the most active organ of the embryo, by its growth liberating the embryo from the seed and putting root and shoot into their proper relations. In other words, it is the organ of the embryo that orients the young plant for its independent existence. This was the basis for Darwin's remark that if a seed plant can be imagined to have a brain it would be found in the hypocotyl. See **EMBRYO**.

HYPOCRITE, THE. A play by Isaac Bickerstaffe, produced in 1768, and founded on Cibber's *Non-Juror*, which, in turn, was taken from the *Tartuffe* of Molière.

HYPOCYCLOID See **CYCLOID**.

HYPODERMIC MEDICATION (from Gk *ὑπό*, *hypo*, under + *δέρμα*, *derma*, skin). Introduction of medicines beneath the skin with a hypodermic syringe. This method is often preferable to that of giving them by the mouth, particularly when a rapid result is essential. The stomach is sometimes in a condition which will not bear the presence of drugs, particularly narcotics, and these are the agents which are most frequently administered hypodermically. A small graduated glass syringe attached to a slender hollow needle, cut off obliquely so that its sharpened extremity may easily be made to pierce the skin, is used. The medicine may be thrown in just beneath the skin, or the point of the sy-

ringe is thrust into the body of a muscle. The wounding of blood vessels or nerves should be carefully avoided, and therefore the operator should not be undertaken except by a physician or a trained nurse. Local pains may generally be more successfully treated in this manner than by the common method. In some cases an anæsthetic may, however, be preferable. It is usual to make a special preparation of the drug which is to be introduced. The syringe must be completely filled when used, as the introduction of an air bubble into a vein might be attended with danger. All instruments and drugs used should be thoroughly sterilized, and the skin over the point of puncture cleansed with an antiseptic. The hypodermic syringe should be used with great caution and never by the patient.

HYPODERMIS (Neo-Lat., from Gk *ὑπο*, *hypo*, under + *δέρμα*, *derma*, skin). In plants, a layer of cells beneath the epidermis. An archesporial cell is said to be hypodermal in origin when it arises immediately beneath the epidermis. Tissues bordering directly upon the epidermis are called *hypodermal*.

HYPODERMOCLYSIS (Neo-Lat., from Gk *ὑπό*, *hypo*, under + *δέρμα*, *derma*, skin + *κλύσις*, *klysis*, a washing). The infusion of saline solution beneath the skin. The term is sometimes used to cover intravenous infusion also. The infusion of saline solution has to a large extent replaced the older operation of blood transfusion, being safer, always available, and obviating the difficulty of obtaining a suitable donor of blood.

Solutions of sodium chloride containing 0.65 to 0.75 per cent of that salt preserve and do not disintegrate the blood corpuscles. The total percentage of saline and alkaline constituents in human blood are variously given by different observers and probably vary in different individuals and under different conditions of the body. A formula which will reproduce exactly the chemical composition and specific gravity of the inorganic portion of the blood serum is not practicable, but the following "artificial serum" answers all purposes.

Sodium chloride	50 grains
Potassium chloride	2 "
Sodium sulphate	} each
Sodium carbonate	
Sodium phosphate	
Boiling water	1 pint

Such a solution may be introduced into a vein or injected slowly under the skin, at a temperature of 100° F., or it may be introduced into the lower bowel (*enteroclysis*). The injection of saline solution is employed in hemorrhage, shock, typhoid fever, cholera, and in septic conditions generally. In hemorrhage it acts mechanically by filling the vessels and raising the blood pressure. In shock and collapse it serves as a stimulant, and in toxæmias it acts as an eliminant as well. From a half pint to a quart of solution is used for each injection. See **TRANSFUSION OF BLOOD**.

HYPOGYNY, *hi-pōj'i-ni* (from Gk *ὑπό*, *hypo*, under + *γυνή*, *gynē*, woman). The condition in a flower in which the sepals, petals, and stamens arise from beneath the ovary. As a consequence, the ovary is seen inside of the flower and is often spoken of as "superior." The contrasting term is "epigyny" (q.v.). Hypogynous flowers are more primitive than epigynous flowers. The primitive Angiosperms all

have hypogynous flowers, which in turn have arisen from the conelike clusters of the Pteridophytes and Gymnosperms, while all of the three great divisions of Angiosperms (Aichichlamydeæ, Sympetaleæ, and Monocotyledons) culminate in families with epigynous flowers. It is quite evident, therefore, that one of the strongest evolutionary tendencies among Angiosperms is to pass from hypogyny to epigyny. See FLOWER, EPIGYNY, PERIGYNY.

HYPONASTY (from Gk *ὑπό*, *hypo*, under + *ναστός*, *nastos*, close-pressed, from *νάσσειν*, *nassein*, to pack closely). In botany, a term applied by De Vries to the occurrence of greater growth upon the underside of a dorsiventral organ, which produces therefore an upward curvature. This may be due to internal or external causes. It is the common condition of young leaves and flower parts when in the bud. The correlative term is "epinasty" (q v). See GROWTH, IN PLANTS.

HYPONITRITES. See HYPONITROUS ACID.

HYPONITROUS ACID, $\text{H}_2\text{N}_2\text{O}_2$. A dibasic acid composed of hydrogen, nitrogen, and oxygen, which has been isolated in the form of a crystalline solid substance. It is very soluble in water and is violently explosive. Its salts are termed *hyponitrites*, and the free acid itself is best prepared from the hyponitrite of silver by the action of a solution of hydrochloric acid gas in ether. Silver hyponitrite, $\text{Ag}_2\text{N}_2\text{O}_2$, is a solid yellow substance that may be obtained by allowing sodium amalgam to act upon barium nitrite, neutralizing the resulting solution with acetic acid and precipitating with silver nitrate. Silver hyponitrite explodes if heated to a moderately high temperature. The solution of free hyponitrous acid decomposes, on heating, into nitrous oxide (laughing gas) and water.

HYPONOME. See CEPHALOPODA.

HYPOPHOSPHITES. See HYPOPHOSPHOROUS ACID.

HYPOPHOSPHOROUS ACID, H_3PO_2 . A crystalline compound that melts at about 17.5°C (63.5°F) and is readily transformed into ordinary phosphoric acid. It may be obtained by boiling caustic potash with phosphorus, subsequently adding sulphuric acid, concentrating the solution by evaporation, and allowing it to crystallize in the cold. The salts of hypophosphorous acid are termed *hypophosphites*, those of iron, calcium, sodium, and potassium being extensively used in medicine, and often forming ingredients of patent medicines which are claimed to be valuable remedies for tuberculosis. Most such preparations are worthless, being mixtures of the hypophosphites of two or more metals, the several ingredients of which may counteract one another, and some such mixtures are positively harmful. On the other hand, if prescribed separately in moderate doses by a competent physician, the hypophosphites often constitute valuable therapeutic agents, inasmuch as they have the effect of improving nutrition and relieving some of the symptoms of phthisis. The hypophosphite of potassium may be used as an expectorant in chronic bronchitis. The official sirup of hypophosphites contains several hypophosphites, a considerable amount of free hypophosphorous acid, and often some iron.

HYPOPHYESIS. A term used in dicotyledonous plants to designate the cell of the proembryo which completes the hypocotyl tip of the embryo. It is the appearance of the hypophy-

sis that finally differentiates the proembryo into embryo and suspensor.

HYPOSTASIS (Neo-Lat., from Gk *ὑπόστασις*, *hypostasis*, subsistence, from *ὑπόστατος*, *hypostatōtos*, substantial, from *ὑπαστάειν*, *hyphestanai*, to stand under, from *ὑπό*, *hypo*, under + *ιστάειν*, *istanai*, to stand). A term of Greek theology, denoting reality as distinguished from appearance and variously employed before the fourth century, but at last technically used to denote personal distinctions in the Godhead. The Council of Nicæa (325) did not clearly distinguish between *hypostasis* and *ousia* (substance and essence), and a controversy followed (See HOMOOUSION). The same uncertainty appears in the West as late as Augustine, who confesses that he does not understand the difference between the two Greek words (*De Trinitate*, v, 8, 10). But gradually the two words were differentiated, and *hypostasis* came to be used exclusively for the personality of Father, Son, or Holy Spirit. It was thus interpreted as being equivalent to *prosopon*, which the Latin rendered by *persona*, whence our word "person," applied to the Trinity. The fully developed trinitarian dogma asserts one essence, or substance (*ousia*), and three persons (*hypostasis*) in the Godhead. This has remained the orthodox doctrine of the Church. Consult Friedrich Loofs (Halle, 1893), G. P. Fisher (New York, 1896), Adolf Harnack, *History of Dogma*, vol. iv (Boston, 1899), J. Tixeront, *History of Dogmas* (3 vols., St. Louis, 1910), A. L. Graebner, *Outlines of Doctrinal Theology* (2d ed., ib., 1911), T. von Haering, *History of Dogma* (New York, 1911). See CHRISTOLOGY, TRINITY, DOCTRINE OF THE

HYPOSTATIC UNION. A term used to describe the union of Christ's human nature to the hypostasis or person of God the Word, in virtue whereof, while each nature is complete even after union, yet there is but one undivided person of the God-man, to which all the actions, whether divine or human, are ascribed. This form of expression was devised for the purpose of excluding the doctrine of a mere moral union held by Nestorius. See CHRISTOLOGY, MONOPHYTES, NESTORIANS, TRINITY, DOCTRINE OF THE

HYPOSULPHITES. See THIOSULPHURIC ACID.

HYPOTENUSE (Fr. *hypoténuse*, from Gk *ὑποτενύουσα*, *hypotenousa*, subtending, from *ὑποτείνειν*, *hypotenain*, to subextend, from *ὑπό*, *hypo*, under + *τείνειν*, *teinon*, to stretch). That side of a right-angled triangle opposite to the right angle. The hypotenuse is the longest side of the triangle, and its mid-point is the centre of the circumscribed circle. According to the famous forty-seventh proposition of the first book of Euclid's *Elements*, the square of the hypotenuse of a right-angled triangle equals the sum of the squares on the other two sides. The proof of this proposition is attributed to Pythagoras, although the fact was known in Egypt, and probably in China and elsewhere, long before the time of this philosopher.

HYPOTHEC, **HYPOTHECATION** (ML. *hypothecatio*, from *hypotheca*, to hypothecate, from Lat. *hypotheca*, from Gk *ὑποθήκη*, *hypothēkē*, pledge, from *ὑποτίθεσθαι*, *hypotithenai*, to place under, from *ὑπό*, *hypo*, under + *τίθεσθαι*, *tithenai*, to place). A lien on property created by agreement or by operation of law. In the most general sense a transaction whereby property, real or personal, is subjected to the claim of another. "Hypothecation" is not a term of

English or American law, but the verb "hypothe-
cate" is sometimes popularly employed as the
equivalent of "pledge." At Roman law hypothec
was the right to take and sell property belong-
ing to another to satisfy a claim. Any balance
remaining after a creditor's claim was satisfied
was restored to the former owner of the prop-
erty. Hypothec might be established by the act
of the owner (English mortgage), or it might
be created by law (English lien). In either
case the hypothecation might be of real property
or of personal property, or of both. Many of
the legal liens extended over the debtor's entire
estate, real and personal. Hypothec was dis-
tinguished from pignus, or pledge, in that it
was established without delivery of possession.
In modern civil law the term "hypothec" is
commonly restricted to the mortgage or lien
upon real property. At French law a lien upon
movables or upon an entire estate is termed a
"privilege," the term "hypothèque" being con-
fined to the mortgage of real estate. In Spanish
law the term is restricted to the contractual
mortgage of real property, all legal liens,
whether upon realty or personalty, are "prefer-
ences." In Scotland, however, a legal lien upon
personal property is called a hypothec. See
LIEN, MORTGAGE, PLEDGE, and consult the au-
thorities referred to under REAL PROPERTY.

HYPOTHENUSE See HYPOTENUSE

HYPOTHESIS (Gk *ὑπόθεσις*, supposition,
from *ὑποτίθεμαι*, *hypotithenai*, to place under,
from *ὑπό*, *hypo*, under + *τίθεμαι*, *tithenai*, to
place). In scientific procedure, a conjecture as
to the explanation of any phenomenon, made
provisionally and used as a starting point for
further investigation and theory. Thus, in
studying the motion of the moon, Newton made
the hypothesis that its divergence from the
straight line was due to the same cause that
brings an apple to the ground when released
from the stem. He then proceeded to find
whether the rate of fall in the two cases was
expressible by some single formula. After years
it was discovered that this was the case. It
is now quite generally admitted that an hypothe-
sis, to have any value, should be based on some
known law and should be the conjectural ex-
tension of that law to a new sphere under
investigation. Thus, Newton worked from the
known law of gravitation on the surface of the
earth. The hypothesis of a luminiferous ether
is based on the known laws of the motion of
fluids, etc. Such a known law is called a *vera*
causa. Some empirical extremists insist not
only that the point of departure must be a
known law, but that the extension of this law
to another sphere may not be legitimately made
unless its extension is at least conceivably ver-
ifiable by sense perception. Thus, they claim
that the existence of the luminiferous ether is
not a rigidly logical hypothesis, because the
ether is thought of as having no properties per-
ceivable by our senses without the use of instru-
ments that no one even supposes capable of
construction. Such an interpretation of the
vera causa is, however, not in accordance with
actual scientific practice. An hypothesis is a
provisional attempt to *think* things together as
instances of the prevalence of the same law,
and all that is necessary to make an hypothesis
valuable is that it should furnish some con-
ception which shall at least provisionally unify
experience by reducing it to law. A distinction
is often made between theory and hypothesis

A theory is said to be a verified hypothesis.
This distinction is one of degree, not of kind.
Even an hypothesis which has been verified may
be overthrown by new facts, so that it is rather
the fashion nowadays to speak of all the con-
ceptions of natural science as "*working* hypothe-
ses," and to say that they are accepted only
tentatively as the basis for further investiga-
tions and for further theorizing on results. Ac-
cording to the pragmatistic logic (see PRAGMA-
TISM), all truth is nothing but successfully
working hypothesis. See KNOWLEDGE, THEORY
OF. For bibliography of the subject, see the
works cited in the article LOGIC.

For the use of this term in geometry, see
THEOREM.

HYPOTHETICAL QUESTION In the
law of evidence, the form of question through
which the opinion of an expert witness is
properly elicited. In order that the opinion of
such a witness shall be of any value to the
court or jury trying the case, it is obvious that
it must be based on the facts on which the
verdict is to be rendered, otherwise it would
be irrelevant and on that ground inadmissible.
On the other hand, it is not deemed proper to
ask an expert witness to give his opinion—as
of the mental soundness of a testator or the
sanity or insanity of a defendant in a criminal
case—on the evidence which has been adduced
in his hearing in the course of the trial. To do
this would be to require him to make a finding
on those facts, perhaps on conflicting or untrust-
worthy evidence, as a basis for his opinion, and
thus in effect, as it is sometimes expressed, to
usurp the functions of the jury in passing on
the evidence. It is simpler and less confusing
to get his opinion on an assumed set of facts.
This is the function of the hypothetical ques-
tion. Its value—or rather the value of the
opinion rendered—depends, of course, largely on
the closeness with which the assumed, or hypo-
thetical, facts embodied in the question conform
to the facts in evidence, or, better yet, to the
facts as they present themselves to the court
or jury with whom the decision of the case
rests. The use of the hypothetical question has
been much criticized, but this is due to the
abuse of a method which is commonly employed
in argument and reasoning, and which is prob-
ably indispensable, as it is valuable, in the
production of opinion evidence. See EVIDENCE,
OPINION.

HYPFOXANTHINE, *h'pō-zān'thīn* (from Gk.
ὑπόξανθος, *hypoxanthos*, yellowish brown, from
ὑπό, *hypo*, under + *ξανθος*, *wanthos*, yellow),
or SARCINE, $C_6H_7N_3O$. An organic substance
chemically allied to xanthine, which it usually
accompanies. It was discovered by Scherer in
1850. If given to birds, hypoxanthine is ex-
creted largely in the form of uric acid, it is not
known by what organ this transformation is
effected—probably not by the liver. Hypoxan-
thine is widely distributed in the animal and
vegetable kingdoms. It was synthesized by Emil
Fischer in 1897 and again, in a different way,
by Traube in 1904. It is a white crystalline
substance, slightly soluble in cold water, but
somewhat more readily soluble at higher tem-
peratures. See XANTHINE.

HYP'SILANTIS See YPSILANTIS

HYPSSIPYLE, *hip-sip'i-lē* (Lat., from Gk.
Ἑψιπύλη). The daughter of Thoas of Lemnos,
whom she saved when the women of the island
killed all the other men in revenge for their

neglect. When the Argonauts (qv) came to Lemnos, Hypsipyle became by Jason the mother of two sons, Euneus and Nebiophonos, or Thoas. Having been driven out because she had spared her father, Hypsipyle became the nurse of Opheltus, son of the Arcadian King Lycurgus. When Adrastus and the other heroes were on their way to the siege of Thebes, they met Hypsipyle in the Nemean Forest and begged her to show them a spring, and during her absence the boy was killed by a serpent. For this neglect she was imprisoned, but was rescued by her sons. The funeral games instituted by the heroes for the dead Opheltus were the origin of the Nemean Games. See NEMEA.

HYPSISTARIANS (from Gk. Ὑψιστάρηαι, *Hypsistarioi*, Hypsistarians, from ὕψιστος, *hypsistos*, most high, from ὑψι, *hyspi*, on high). A small sect which existed in the third and fourth centuries in Asia Minor. It seems to have been monotheistic and Jewish in some of its features, and in others possibly Christian, debased by Sabeian elements. It taught the unity of the Deity and His universal dominion, that sacrifices and other phenomena of external worship were to be given up; at the same time it enjoined Sabbath observance and the dietary laws of the Jews. The sect is described by Gregory of Nazianzus in his account of his father. Consult Cumont, *Hypsistos* (Brussels, 1897).

HYPSOMETER (from Gk. ὑψι, *hyspi*, on high + μέτρον, *metron*, measure), or **THERMOBAROMETER**. A name commonly applied to an apparatus arranged to determine the atmospheric pressure at a given point by ascertaining accurately with a thermometer the temperature at which water boils. The boiling point of water diminishes with a decrease in the pressure of the atmosphere, and this always comes with an increase in elevation above the sea level. With the barometer (qv) it is possible to measure heights with considerable exactness, consequently, by knowing the atmospheric pressure corresponding to the temperature at which water boils, we are able to find the altitude. The apparatus to determine the boiling point was first used by Wollaston in 1816 and consisted of a metal vessel containing a delicate and carefully tested thermometer with graduations extending from 80° to 100° C, which could be read to 0.01 of a degree. There is a spirit lamp to boil the water, and the instrument is far more portable than a mercurial barometer. The relation between the boiling point of water, the height of the barometer, and the altitude is shown in the following table, which is calculated for a mean temperature of the atmospheric mass in the vicinity of the point of observation.

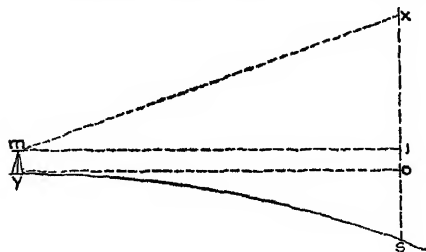
Boiling point (Centigrade)	100°	99°	98°	97°	96°	95°	94°	93°	92°	91°	90°
Height of barometer (mm)	760	732.2	707.1	681.9	657.4	633.7	610.6	588.3	566.7	545.8	525
Elevation (in meters)	0	305	610	920	1225	1540	1850	2165	2485	2800	3120

From this table it will be seen that a variation of 0.1° in the boiling point at sea level corresponds to a decrease in the height of the barometer of 28 millimeters, at an elevation of 1000 meters 25 millimeters, at 2000 meters 22 millimeters, and at 3000 meters 21 millimeters. An approximate rule to determine the elevation of a place by this method, expressed in feet and Fahrenheit degrees, is to multiply the difference between the observed boiling point and 212° by

550 if the height is less than half a mile, and by 560 if it is in excess of that amount, these factors representing the average amount of altitude corresponding to 1° at 70° F.

Hypsometers of very accurate construction have been extensively observed with great care in long series of observations made aboard ship by Hecker, also under the direction of L. A. Bauer on board the magnetic yacht *Carnegie*, for the purpose of ascertaining the variations in the force of gravity at sea. As explained above, the pressure of the air is obtained from the readings of the hypsometer. Simultaneous readings of high-grade mercurial barometers should also give the same pressure, except that when all corrections are applied there will still be an outstanding difference between the two pressures thus obtained, because the mercurial barometer is influenced by the force of gravity, while the hypsometer is not. The variable outstanding differences found from point to point over the ocean therefore represent corresponding variations in the force of gravity. This is perhaps the only practicable method of measuring variations of gravity at sea, but the quantities desired are so small, compared with the unavoidable inaccuracies of the observations under even the most favorable circumstances, that entirely conclusive results are hardly attainable as yet. Consult Hecker, *Memoir of the Prussian Geodetic Institute* (1908), and Bauer, *American Journal of Science* (January, 1911, and March, 1912).

HYPSOMETRY. The art of measuring heights on the earth's surface. Such measurements are performed by means of trigonometrical observations and calculations, by running a line of precise levels starting from mean sea level and terminating at the point whose height is to be measured, and by barometric observa-



tions and calculations. The second of these methods of measurement gives exact heights, but the other two methods give approximate heights only. To illustrate the application of the three methods of measurement, a supposititious case will be assumed, and each method applied to its

solution. Let x represent the top of a mountain whose height above the base s it is desired to measure by trigonometrical observation, and whose distance m from the point of observation is known. The instrument is set up at y , and by it the vertical angle mx is measured. This gives the observer a triangle mxs , of which the side m , the angle mxs , and the angle msx (90°) are known, and from these data he can readily calculate the length of the side xs . To this

dimension in order to get the height of the mountain he must add the dimension 10 , which is the height of the instrument above the ground, and the dimension os , which is due to the curvature of the earth. The dimension 10 is easy to determine, but os has to be calculated. Now, the curvature of the earth is 0.667 foot, or nearly 8 inches in 1 mile, and increases as the square of the distance, being thus 32 inches in 2 miles and 72 in 3 miles. If then the distance m is 1 mile, the dimension os is 0.667 foot. Owing to the refraction of the atmosphere, however, the point x always appears to the observer to be higher than it really is, and at an average this deceptive elevation amounts to one-seventh of the curvature of the earth and, like the latter, varies with the square of the distance. For a distance m equal to 1 mile, then, the dimension os is 0.667 foot due to curvature minus one-seventh of 0.667 foot due to refraction, which makes it 0.5714 foot. In careful geodetic work the calculations for refractions and curvature are made with much more precision than is done above, and the instrument observations are made with exceeding care, but the general method is the same. At best such measurements are only approximate, since the determination of the refractions, which depends upon the atmospheric conditions, can be approximate only. To measure the height xs by leveling, the observer starts from mean sea level and runs a line of precise levels inland, which terminates at the point x and establishes accurately its height above mean sea level. The same result may be accomplished by starting the line of levels to x from a point on a line of levels previously run from mean sea level. The method of running precise levels differs from ordinary spirit leveling (see LEVELING) only in the greater accuracy of the methods and instruments used.

For measuring heights approximately by barometric observations, the aneroid barometer is usually used. Mercury barometers are more accurate and may of course be used, but usually they are not, owing to the greater difficulty in transporting them and of keeping them in proper working order. The adaptability of the barometer as an instrument for measuring heights depends upon the facts that the mercury column falls as the atmospheric pressure decreases, and that the atmospheric pressure decreases gradually as we ascend above the sea level. As a rough average, it may be assumed that the barometer falls $1/10$ inch for about 106 feet rise. To measure the height xs , therefore, according to Laplace's formula barometer readings are taken simultaneously at s and at x , and from them the difference in height of s and x may be found by the formula

$$d = 60,158.6 (\log H - \log h) \left(1 + \frac{T + t - 64}{900} \right),$$

in which d equals the difference in height in feet, H and h are the two barometric readings in inches of the lower and upper stations, and T and t are the temperatures of the corresponding stations in degrees Fahrenheit. In the most accurate barometric work various refinements of observation and calculation are introduced, but the general principle of the operation is the same as has been described. Barometrical measurements of heights are only approximate, since the moisture and dryness of the air, the wind, and various other atmospheric phenomena cause variations in the readings recorded, and no comprehensive formula can possibly be devised. Sim-

ultaneous observations, with barometers adjusted to the same standard, give the most reliable results.

By using a finely graduated thermometer to determine the boiling point of water it is also possible to determine the pressure and thereby the altitude, this method being used by mountain climbers, as the apparatus, which consists of a thermometer, spirit lamp, and vessel to contain snow or ice, is very portable. An approximate rule is, calling the boiling point at sea level 212° F, to allow 511 feet for the first degree of difference and increase the number to be added 2 feet for each degree. Thus,

ELEVATION	BOILING POINT
0 feet	212°
511	211
$511 + 513 = 1024$	210
$1024 + 515 = 1539$	209, etc

Geographer's tables of corresponding heights have been worked out in considerable detail, as in the *Smithsonian Miscellaneous Collection* (Washington). For a full discussion of the methods of measuring heights by trigonometrical leveling, precise leveling, and barometric observations, consult Johnson, *Theory and Practice of Surveying* (17th ed., rewritten by L. S. Smith, New York, 1913). See SURVEYING, HYPSONOMETER.

HYRACEUM (Neo-Lat., from Gk *ὑραξ*, *hyrax*, mouse, connected with Lat *scoræ*, shrew-mouse). A peculiar substance found in the crevices of the rocks of Table Mountain, Cape of Good Hope. It is one or more of the excrements of the Cape hyrax (*Hyrax capensis*). Hyraceum is a blackish-brown viscid material, not unlike soft pitch, having a strong and offensive taste, not unlike castoreum, for which it has been used as a substitute in medicine, though now obsolete. At one time so large a quantity was found as to suggest the idea of its being used as a manure, but the supply was soon exhausted.

HYRACODON (Neo-Lat., from Gk *ὑραξ*, *hyrax*, mouse + *ὀδούς*, *odontis*, tooth). A primitive fossil rhinoceros found in the Miocene rocks of western America and Europe. See RHINOCEROS.

HYRACOTHERIUM (Neo-Lat., from Gk *ὑραξ*, *hyrax*, mouse + *θηρίον*, *thērion*, dim of *θήρ*, *thēr*, wild beast). An extinct four-toed ungulate mammal of the size of a fox, generally considered as an ancestral horse, remains of which are found in the Lower Eocene deposits of Europe and western North America. See HORSE, FOSSIL.

HYRAX (Neo-Lat., from Gk *ὑραξ*, mouse). A general name for a suborder (Hyracoidea) of small, peculiar, ungulate mammals comprised in a single genus and family (*Procavia*, *Procaviidae*), whose species are locally called conies, damans, and rock rabbits. Numerous species and subspecies are known in southwestern Asia and in East and South Africa. Although having the size and superficial appearance of rodents, and long so considered, Cuvier pointed out their essential agreement, in dentition and anatomical characters, with the ungulates. The molars are quite similar to those of the rhinoceros but the upper jaw has two incisors curving downward and during youth two very small canines, the lower jaw four incisors without canines. The skull, also, and other bones resemble those of the rhinoceros. The muzzle is short and pointed, the ears short and round. The

ribs are more numerous than even in the rhinoceros—21 pairs, a number exceeded in no quadrupeds except the sloths, whereas no rodent has more than 15 pairs. The toes are united by the skin, as in the elephant and rhinoceros, and are round and soft, merely protected in front by a broad nail, which does not reach the ground. The legs are short. The tail is a mere tubercle. Their bodies are clothed with thick, uniformly dark brown hair, except that it is discolored around a curious gland near the middle of the back, which is naked in several species.

The habits of all the conies (except the tree hyraxes) are much alike. The typical Abyssinian species live in rocky or stony places, in communities, like rabbits, and make their homes in holes under rocks or in a rocky watercourse. They seem to be mainly nocturnal and feed at night or in the early morning on leaves and young shoots of trees and bushes. In daytime they lie on rocks in the shade until towards noon, when they are likely to retire to their holes. They are very timid and disappear when they are in the least danger. The only sound they seem to make is a shrill squeak when suddenly alarmed. This description will remind the reader of the closely similar behavior of the pikas (q v) of the Rocky Mountains, often called conies. Mosely speaks of "a short, hissing noise" as the alarm cry of the Cape hyrax. All climb about smooth rocks with wonderful agility, which is explained by soft, almost suction-giving pads on the soles of their feet. (Consult Schweinfurth, *Heart of Africa*, vol. 1, Leipzig, 1878.) The species longest known is the only Asiatic one (*Procavia syrica*), which inhabits Arabia, Syria, and Palestine, and is the animal called cony in the ordinary version of the Bible, for which the Syrian name is daman. It was among those animals prohibited to the Israelites under the mistaken belief that they chewed the cud, but they are now eaten by the Arabs, though not regarded as very palatable by Europeans. Several species inhabit Abyssinia and East Africa, down to Mozambique, and Cape Colony and Natal are the home of a kind (*Procavia capensis*) having very fine, soft, brown fur, with the spot on the back black, which is familiar to the English colonists under the names rock badger and rock rabbit and to the Dutch as dassie. They are often tamed as pets.

Three species of the genus *Dendrohyrax*, which live in East and West Equatorial Africa, differ decidedly from other conies by the habit of spending their lives and making their breeding nests in holes in trees. These three species agree in that the females have but a single pair of teats (other hyraxes have three pairs), and the West Coast one is remarkably large and furry, so that its skin is of much value as material for cloaks.

Consult, for systematic revision of the order, Thomas, "On the Species of the Hyracoidea," in *Proceedings of the Zoological Society of London* (London, 1892), and Sclater, *The Mammals of South Africa*, 1 (ib, 1900).

HYRCANIA (Lat, from Gk Ὑρκανία, *Hyrkama*). An ancient district of Asia, south of the Caspian Sea (anciently called Hyrcanum Mare), bounded on the southeast by the Sariphi Mountains (now Elburz), which separated it from Parthia proper, and on the west by Media. It corresponded to the modern Mazanderan and Astrabad. The district is called Vehrkanā in the *Avesta*, a name which recalls the ancient

name for wolf (*vahika*). The region was wild and heavily wooded, and not generally fertile, with the exception of the valleys among the hills, which produced corn, oil, and wine. The river Gurgan, or Jurjan, an affluent of the Caspian Sea, has preserved the name of the ancient province.

HYRCANUS (Lat, from Gk Ὑρκανός, *Hyrkanos*). The name of two Jewish high priests and princes of the Hasmonæan family. 1 JOHN (Heb, Johanan) HYRCANUS, son of Simon, was, during the lifetime of his father, Governor of the seacoast, with his seat in Gazara, and defeated Cendebeus, the Syrian general. When Simon was murdered by his brother-in-law, Ptolemy, an attempt was made also on Hyrcanus, but he escaped and obtained control of Judæa (135 B C). At the beginning of his reign Antiochus VII Sidetes invaded the country, and Hyrcanus was compelled to sue for peace after having been shut up in Jerusalem. Antiochus showed himself inclined to be sparing, and Jerusalem escaped destruction. In 130-129 B C Hyrcanus assisted Antiochus in a campaign against his brother, Demetrius Nicator, in which, however, Antiochus lost his life. Demetrius' short reign marked a period of internal dissensions in Syria, which enabled Hyrcanus to establish the independence of Judæa. In this his alliance with Rome was of material help. After the fall of Demetrius and his rival Alexander Zabina, Hyrcanus began (c 123 B C) the conquest of troublesome neighbors. First attacking Medaba in the Jordan district, he marched towards Shechem and succeeded in destroying the Samaritan temple on Mount Gerizim (c 120 B C), though the Samaritans were not brought to submission till c 109 B C. Next the Idumæans were conquered and compelled to accept the Jewish faith. Even the trans-Jordanic peoples felt the power of Hyrcanus. Coins were minted with the inscription "Johanan High Priest and Chief of the Commonwealth of the Jews." Like the rulers of his family before him, Hyrcanus was a Pharisee, but because of an aspersion cast upon his mother, who had been a prisoner of war, he became a Sadducee, and the latter part of his reign was involved in this factional difficulty. He died in 104 B C and left five sons—Aristobulus, Antigonus, Alexander, Absalom, and another whose name is not known—two of whom, Aristobulus I and Alexander Jannæus, governed with the title of King. It has been suggested by Adolphe Reinach (*Revue des études juives*, lxxv, p. 303, Paris, 1914) that he may have received the surname as a consequence of his participation in the expedition of Antiochus VII Sidetes into Hyrcania. 2 HYRCANUS II, son of Alexander Jannæus and grandson of the preceding. On the death of his father, in 76 B C, he was appointed high priest by his mother, Salome Alexandra, who ruled Judæa herself for several years. After her death (67 B C), he became temporal ruler also, but his younger brother, Aristobulus, an abler and more energetic man, seized the government and forced Hyrcanus to make an agreement by which Aristobulus was to rule and Hyrcanus to be only high priest. Induced by the Idumæan Antipater, he broke this agreement, and, aided by Aretas, King of Arabia Petræa, he endeavored to win back his dominions. Scaurus, the legate of Pompey, was bribed by Aristobulus, and Aretas had to abandon the siege of Jerusalem. By counter bribery on the part of Antipater, Hyrcanus obtained the

control Pompey took away the kingship from Hyrcanus, leaving him high priest, and proclaimed Antipater Governor of the country in 63 B.C. Aristobulus and his two sons, who had been carried away captives, tried at different times to wrest the power from Antipater, but failed. Finally, in 47 B.C., Cæsar made Hyrcanus tetrarch and high priest, and Antipater was made procurator. Those around Hyrcanus and Hyrcanus himself began to suspect Antipater, and, while banqueting with Hyrcanus, Antipater was poisoned (43 B.C.), though Hyrcanus was not involved in this act. In 40 B.C. Antigonos, son of Aristobulus II, with the help of the Parthians, invaded the land, captured Hyrcanus by treachery, cut off his ears and thus disqualified him for the office of high priest, and carried him off to Seleucia on the Tigris. Some years later Herod, son of Antipater, obtained supreme power in Judæa and invited the aged Hyrcanus home to Jerusalem. For some time he lived in ease and comfort, but, falling under suspicion of the intrigues against Herod, was put to death (30 B.C.). Consult Gratz, *Geschichte der Juden*, vol. II (Berlin, 1854-75), Schurer, *Geschichte des jüdischen Volkes*, I (4th ed., Leipzig, 1901), Bevan, *The House of Seleucus* (London, 1902), Bouché-Léclercq, *Histoire des Séleucides* (Paris, 1913), Wellhausen, *Israelitische und jüdische Geschichte* (7th ed., Berlin, 1914).

HYRIEUS, hi-rî'ë-üs or hi-rî'ûs (Lat., from Gk. Ἥριος, *Hyrieus*, Ὀυριεύς, *Ourieus*). Son of Poseidon and King of Hyria in Boeotia, for whom Agamedes and Trophonius built a treasure house. In this, one stone was so arranged that it could be removed from the outside, thus enabling them to plunder the treasury at will. When Agamedes was finally caught in a trap set by the King, Trophonius cut off his brother's head to prevent discovery and fled to Lebadea, where he was swallowed up by the earth. (See **TROPHONIUS**). The story is told also of Rhampsinitus, a king in Egypt, by Herodotus (II, 121) and is found as a folk tale in many lands and in many variations.

HYRTL, hîr'tl, JOSEPH (1810-94). An Austrian anatomist, born in Eisenstadt in Hungary. He was educated at the University of Vienna, where he became prosecutor in 1833. He became professor of anatomy at Prague in 1837 and filled a similar position at Vienna from 1845 to 1874. His last years were spent in retirement and almost total blindness. Hyrtl endowed several charities in Vienna and elsewhere, especially orphan asylums and nurseries. His high rank in the scientific world was recognized before his death by the erection of a colossal marble statue in the arcade of the University of Vienna (1889). His researches dealt with comparative anatomy, especially that of fishes, the construction of the ear and of the testicles, and, above all, with the subject of angiology, in which his great discoveries were made. Besides monographs on such subjects, including *Untersuchungen über das Gehörorgan des Menschen und der Säugetiere* (1845), *Vergleichende Angiologie* (1850), and *Die Blutgefässe der menschlichen Nachgeburt* (1870), he wrote on general anatomy, *Lehrbuch der Anatomie des Menschen* (1846, 20th ed., 1889) and a valuable and original *Handbuch der topographischen Anatomie* (1847, 7th ed., 1882), and on the history of anatomical nomenclature, *Das Arabische und Hebraische in der Anatomie*

(1879), *Onomatologia anatomica* (1880), and *Die alten deutschen Kunstorte der Anatomie* (1884). But his most important work was as a technical anatomist. He had great practical skill, devised special preparations for the dissection of various organs and a microscopical preparation to show the capillary vascular network of the lesser organs, and wrote a *Handbuch der praktischen Zeigheidekunst* (1860).

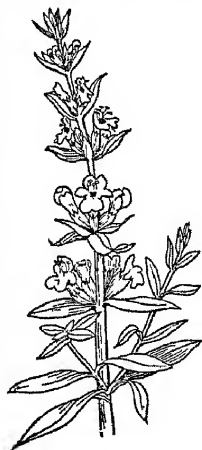
HYSLOP, his'lop, JAMES (1798-1827). A Scottish poet, born and brought up on a farm in Kirkconnel Parish, Dumfriesshire. He was entirely self-taught, but, while in the employ of a sheep farmer in Muirkirk (1812-16), he became imbued with the Covenant associations of Airdsmoss, which inspired his best poem, 'The Cameronian's Dream' (*Edinburgh Magazine*, 1821). Besides other poems, he published in the same periodical his accounts of a three years' voyage to South America, whither he was taken as tutor on a warship, having had previous experience of teaching in Greenock. After spending three years ashore, in teaching and journalism, Hyslop embarked again as tutor on HMS *Tweed*, but within a month died of fever near the Cape Verde Islands and was buried in the Atlantic. His poems, 82 in all, were published in Glasgow (1887), and two years afterward his masterpiece was set to music by Hamish McCunn (q.v.).

HYS'SOP (AS *ysope*, from Lat. *hyssopus*, *hyssopum*, *hyssopus*, from Gk. ὕσσωπος, *hyssōpos*, ὕσσωπον, *hyssōpon*, hyssop, from Heb. ἔζֶב, sort of aromatic plant), *Hyssopus*.

A genus of one species of the family Labiatae. The common hyssop (*Hyssopus officinalis*), a native of southern Europe and the East and naturalized in the United States, is a half-shrubby evergreen plant, about 1½ feet high, with beautiful blue flowers arranged in one-sided whorled racemes. It has long been cultivated for its aromatic leaves, young shoots, and seeds, which are sometimes used to season salads and soups, but more generally in a dried state as a stomachic and carminative. The virtues of hyssop depend on a volatile oil. A sirup made from the leaves is sometimes used for colds, but the plant is less in favor than formerly. It has been supposed that the hyssop of the Bible is some species of *Phytolacca*, as *Phytolacca acinosa*, a native of Asia and Africa, and the common caper has also been so considered. Hedge hyssop is *Gratiola officinalis*. The giant hyssop is *Agastache nepetoides*. The name "water hyssop" is given the species of *Bacopa*, or *Herpestis*.

HYSTALITE. See **ILMENITE**.

HYSTASPES, his-tās'pēz (Lat., from Gk. Ὑστάσπης). A name found several times in Persian history. 1. It was the name of the father of King Darius I, and according to the Old Persian inscriptions he was Governor of Parthia, and his father's name is given as Arshāma, which agrees also with Herodotus. The name Hystaspes, or Vishtaspa, of the inscriptions is identical in form with (Kavi) Vishtāspa, the



HYSSOP

name of Zoroaster's patron, in the *Alcista*, but there is no historical ground for identifying the two personages, as has been erroneously done by some on the authority of Ammianus Marcellinus. The allusion to Hystaspes in Lactantius in the Church Fathers seems to have reference to Zoroaster's patron. Consult Jackson, *Zoroaster, the Prophet of Ancient Iran* (New York, 1898). 2 HYSTASPES, the son of Darius I and Atossa, was a brother of Xerxes and commanded a force of Bactrians and Sacæ in the latter's army. Consult Justi, *Iranisches Namenbuch* (Marburg, 1895).

HYSTASPES. An ancient Persian author, according to the testimony of several of the Church Fathers. He is supposed to have been a *magus* who wrote a book called *Vaticinia*. Of his life or date we are entirely ignorant. Two passages regarding his writings occur in Justin Martyr—one saying that he foretold the destruction of the world by fire, as the Sibyl did, and the other mentioning the book as an Oriental appendix to the Sibylline works and the prophetic books of the Old Testament. There is in the writing of Clement of Alexandria a reference of doubtful meaning, but usually construed to say that the work was in existence in the second century, and that it referred to the coming of the Messiah and to His kingdom, and another in Lactantius, where Hystaspes, like the Sibyl, is said to predict the destruction of Rome. The name points to Persian origin, but the possibility that it was merely the name of the work, as seems evident from the passage in Clement, when the choice would be due to the fame of the Magians, makes the origin of the work uncertain. Even its existence cannot be considered proved, much less that of an author called Hystaspes. Consult Kuhn, "Eine zoroastrische Prophezeiung in christlichem Gewande," in *Festschrift an Rudolf von Roth* (Stuttgart, 1893), and, for above references to Justin, Clement, and Lactantius, A. C. Cox, *Ante-Nicene Fathers*, vols. 1, 11, vii (Buffalo, 1887).

HYSTERESIS (Neo-Lat., from Gk *ὑστέρησις*, deficiency, from *ὑστερεῖν*, *hysterein*, to be behind, from *ὑστέρος*, *hysteros*, latter, connected with Skt *ud*, AS *ūt*, OHG *uz*, Ger *aus*, Eng *out*). The name given a phenomenon in the magnetization of magnetic substances, which was first observed by Warburg in 1881, and later, in 1885, independently by Ewing, to whom the name is due. It is found that if a rod of iron—or any magnetic substance—is placed in a magnetizing helix, and the electric current through this gradually increased to a certain value and then slowly decreased, the magnetic properties of the rod do not follow the same course when the magnetizing current is decreasing as they did when it was increasing. All the properties due to the magnetization—the induction, the change in length, the change in elasticity, etc.—lag behind the magnetizing force. That is, if these properties have certain values for a given magnetizing force when the current is increasing, they will not return to the same values when, as the current is decreasing, the same magnetizing force is reached, but this force must be still further decreased, or even reversed, before these same values are again obtained. The amount of hysteresis varies greatly with different qualities of iron and steel and with different substances. Its value is most important from a commercial standpoint, because each time the magnetization of a piece

of iron is reversed—as happens at each alternation of an alternating electric current—there is a definite amount of energy lost in heating the iron, and this amount depends on the hysteresis. There is another kind of hysteresis which is quite different. If a given magnetizing current is applied suddenly to a rod of iron, it may not attain its full magnetism instantly, and the fact that time is required to reach this is said to be due to "viscous" hysteresis, or "magnetic lag." For a full discussion of the importance of hysteresis and of the molecular theory, which explains it, consult Ewing, *Magnetic Induction* (London, 1900). See **MAGNETISM**.

HYSTERIA (Lat., from Gk *ὑστέρα*, *hystera*, womb, connected with Lat *uterus*, womb, Skt *udara*, belly). A diseased state of the nervous system, characterized by a great variety of symptoms denoting disordered nervous functions. It was formerly considered to be a disease of the womb, and hence came its name, and it was at one time thought to be trifling and under the control of the will of the patient. Both these ideas are erroneous, for hysteria is frequently found among males and is a disease of very serious nature, involving not only the brain and spinal cord, but also the peripheral nerves and the sympathetic system. The disease is now classed as a psychoneurosis. The psychic element is the more important, although difficult to define, but there are accompanying functional lesions of the sensory and motor nerve tracts. While comparatively rare among Anglo-Saxons, it is said to be widespread among Latin nations and Scandinavians, being especially frequent among the French. Hysteria arises from predisposing causes of an hereditary nature, such as parental alcoholism, epilepsy, insanity, or hysteria, as well as injudicious training or education in youth, with depressing influences, as of surroundings. Exciting causes are overwork, worry, excessive responsibility, sexual excesses, eye strain, profound or prolonged grief, and emotional or other mental shock, and, lastly, severe trauma, such as a railway accident, fall, or blow may produce. Hysteria is found among the working classes as well as among the idle, wealthy, and self-indulgent, who have never learned self-control or practiced self-denial. Two forms of hysteria are described, for reasons of convenience rather than for scientific reasons, as follows: 1 The form of the disease in which the patient is excitable, emotional, and perverse without cause and without intention, and has disturbances of sensation, motion, circulation, secretion, and excretion, usually falling into this condition after strain or stress, a disappointment, or great fatigue. 2 The form of the disease in which the patient has convulsive attacks, known by some as *hysteria major*, in contradistinction to the former variety, which is sometimes called *hysteria minor*. The patient may suddenly sink to the floor, become partly unconscious and rigid, and, either turning pale or remaining rosy, may breathe violently for a few minutes and then recover perfect consciousness. Or the patient may sink to the floor after experiencing a sharp pain or an aura of some sort, uttering a little cry or calling for help, with pale or ashen face and dilated pupils. Convulsions follow rigidity, resembling epileptic convulsions, there may be frothing at the mouth, after a short relaxation, during which the patient gasps, a repetition of the convulsions occurs, with absolute unconsciousness.

Then the patient rolls, tossing the arms and legs about and assuming various rigid positions, occasionally bending the head forward, doubling up the body, clenching the fists, and folding the arms across the chest or the abdomen, or bending the head and feet backward in the pose called *opisthotonos*. After several repetitions of such actions, the patient remaining unconscious, relaxation occurs with a short period of repose, followed at once by attitudes of petition, depression, gayety, etc., the patient being delirious and talking of past events or imaginary encounters, not recognizing, though speaking with, those around her, and controlled by hallucinations of sight and hearing. In a varying time the delirium ceases, and the patient becomes conscious, exhausted, and complaining of tenderness in some part of the body, passes a large quantity of pale, limpid urine, and generally resumes her occupation or goes about her house as if nothing had happened. The whole attack may last from 15 to 50 minutes. If these attacks are frequently repeated, the patient's strength is rapidly undermined, and she may be confined to her bed. The form of hysteria with convulsive seizures is often called *hystero-epilepsy* (qv)—an unfortunate and misleading term, which should not be used. It really means a combination of hysteria and epilepsy in the same person, which is possible but rare.

Hyperalgesia confined to certain spots, circumscribed areas of anæsthesia, or anæsthesia of a half of the body, hysterical deafness, hysterical blindness, twitching of muscles, or contractures of groups of muscles, the *globus hystericus*, or feeling of a lump in the throat, spasmodic closure of the glottis with pseudoasthma, retention of urine, paralysis (either hemiplegia or paraplegia), palpitations of the heart, flushing of face, neck, and scalp, with sweating, coldness of extremities or of the entire body, oedema of the extremities, menstrual irregularities, and vomiting of fluid, are among the symptoms of the disease. Mental changes are certain to occur, amounting only to lack of balance and of will power, or impairment of memory in some, in others also recurring melancholy, rapid emotional play, lack of power of application, impaired judgment, diminished regard for truth, and craving for sympathy. The last two symptoms are the basis for the peculiar actions of "fasting girls", self-mutilating martyrs, alleged sufferers who feign paralysis, pain, tumor, stone in the bladder, etc., and who eagerly submit to surgical operations. The above-mentioned phenomena are sometimes referred to as the stigmata of hysteria.

Hysteria is not dangerous to life. Recovery is rare in prolonged cases, though proper treatment may be followed by cure in cases in which symptoms have reappeared upon provocation many times in the course of a year or two. Harshness used on the erroneous supposition that willfulness or perversity is at the foundation of hysteria always does harm and is unjustifiably brutal. Relief of strain and of worry, change of environment, removal of the patient from home and from accustomed companions in the family, and treatment for indigestion, restoration of function, and nerve building, form the principal features of remedial agencies. Will power must be systematically cultivated, and moral support be given to the patient. Massage, electricity, diet, baths, and sometimes a rest cure, are efficacious.

Psychologically regarded, there are many points of resemblance between hysteria, hypnosis, and dreams, and theories of hysteria tend to correlate the hysterical state either with the hypnotic or with the dream consciousness. An example of the first type is the auto-suggestion theory; hysteria is thought to be a kind of spontaneous hypnosis. We are not told, however, why self-hypnotization should take place, and although many hysterical somnambulisms, anæsthesias, etc., resemble those of hypnosis, the theory is unable to explain the hysterical phenomena which concu with the waking consciousness. Another theory, in some respects similar, is known as the dissociated-idea theory. It is said that in some way, usually as the result of a profound emotional experience, an idea or group of ideas is cut off from the usual train of associations. The field of consciousness is thus restricted, there is a total forgetfulness of other past experiences, and under the dominance of the group the automatisms of hysteria occur. As in the former theory, the state of the hysterical consciousness is regarded as similar to that of the hypnotic consciousness, and the theory is, again, adequate to a large number of phenomena, but the psychology involved in the notion of the dissociated ideas is that of a past generation (see ASSOCIATION OF IDEAS), and the theory fails to explain those hysterias in which consciousness seems to be entirely normal. A third theory finds an intimate relation between hysteria and the dream consciousness, whenever there is an hysterical state, different from the waking consciousness, it is of the same type as the dream. The dream itself is said to be a symbolic presentation which has a remote cause. Briefly, the theory is as follows: at some time previous to the appearance of the hysterical outbreak, usually in childhood, there occurs an experience highly emotional and probably sexual in character, the memory of which is repressed until it plays no part in consciousness. As a result, however, of the conflict between the inhibition and the associative tendency to recurrence, the ideas undergo various transformations until at length they reappear, in dream and hysterical consciousness, in symbolic form, the various symptoms of hysteria are the somatic expressions of the submerged idea. (See DREAMING, FREUD, SIGMUND.) This hypothesis is comparatively recent, and has not yet been brought into relation to current psychological systems, at certain points it needs revision and restatement, but it appears to cover a larger number of facts than any other as yet proposed. (See INSANITY, HYPNOTISM, TEMPERAMENT.) Consult Richer, *Paralysies et contractures hystériques* (Paris, 1892), Janet, *État mental des hystériques les accidents mentaux* (ib, 1894), Fox, *Psychopathology of Hysteria* (Boston, 1913), Freud, *Studien über Hysterie* (2d ed, Vienna, 1909), *Selected Papers on Hysteria and Other Psychoneuroses* (New York, 1912).

HYSTERICS. See HYSTERIA

HYS'TEROEPILEPSY An improper, though frequently employed, term for a variety of hysteria in which convulsive attacks occur, of an epileptoid nature. It is not a form or epilepsy, though not differentiated from that disease till Charcot, of Paris, gave an accurate and intelligent description of hysteria, and often distinguished from it with difficulty. The diagnosis often rests upon the discovery of the stig-

mata of hysteria in the period between the convulsive attacks, as the physician rarely sees the attacks, and the description of the fits by the layman is not reliable Consult Max Nonne, "Ueber Hystero-epilepsie," in *Mittheilungen a d Hamburgurgischen Staatskrankenanstalten*, vol viii (Hamburg, 1910), Margulies, "Zur Frage der Hystero-epilepsie," in *Klinik fur psychische und nervose Krankheiten*, vol. vi (Halle, 1911), Brill, "Hystero-epilepsy (Piblokoto) among the Eskimos," in *Journal of Nervous and Mental Diseases*, vol xl (New York, 1913) See HYSTERIA

HYSTEROTOMY See CÆSAREAN OPERATION.

HYSTRICOMORPHA. See RODENTIA

HYTHE, hîth (AS, haven) A market town and parliamentary borough in Kent, England, 14 miles south of Canterbury With its suburbs it is a favorite seaside summer resort and the seat of the national school of musketry (Map England, H 5) It has an interesting church, under which is an unusual collection of human skulls and bones, reputed to be the remains of Danes slain in a battle fought about

1000 The sea-wall promenade extends 3 miles eastward to Sandgate Hythe owns its water works It is one of the Cinque Ports, but through the silting of its harbor the town proper is now a half mile inland Pop, 1901, 5557, 1911, 6387

HYTHE, THOMAS ALLNUTT BRASSEY, VISCOUNT (1863-) An English publicist, son of the first Earl Brassey (qv) He was educated at Eton and at Balliol College, Oxford, was assistant private secretary to Earl Spencer when he was First Lord of the Admiralty, and assistant secretary to the Royal Commission on Opium in 1894, and became editor of the *Naval Annual* in 1890 In 1892 he contested Epsom Division, Surrey, in 1895 and 1900 Christ Church, and in 1902 Devonport He was the first civil Governor of Pretoria in 1900, initiated the Oxford University Endowment Fund, served as chairman of the Chichester Diocesan Board of Finance, and became lieutenant colonel of the West Kent Yeomen Cavalry He published *The Case for Devolution* (1913) and *Problems of Empire, the Faith of a Federalist* (1904, new ed, with foreword by Earl Grey, 1914).

I

I The ninth letter in the alphabets of western Europe. Its form in the north Semitic and early Greek alphabets, from which it is derived, somewhat resembled a narrow upright Z. (See ALPHABET.)

After various modifications this was straightened into its present shape. The Greek designation, *iota*, of the letter is an adaptation of its Hebrew name *yōd*, 'hand'. Originally the Semitic letter represented the consonantal sound *y*, but later was used also to indicate the vowel *i*. The dot over our small *i* did not come into use until the fourteenth century.

Phonetic Character. The "short *i*" in English is described as a high-front or palatal vowel, made by the blade of the tongue approximating the forward part of the palate or roof of the mouth—the sound heard in *it*. When approximated so far as to make a partial contact or closure, this passes over into a semivocalic or consonantal *y*, as in *you* (*u*), although in English the *y* is often not written, e.g., *myion*, *million*, other variations may be noticed in *charity*, *bird*. The corresponding "long *i*," common in European languages, is found in *machine*, *police*, *prize*. This is sometimes known as the "long *e*" sound in *receive*, *believe*, *seat*. The sound commonly called "long *i*" in English, *wide*, *ice*, and the name of the letter itself (*i* pronounced *eye*), is really a diphthong, like *aisle*, made by premature opening of the lengthened vowel under stress accent. This phonetic change from the older character of the sound was going on during the Middle Period of transition into the Modern English, so that it is now a phonetic rule that Anglo-Saxon or Old English *i* regularly calls for a diphthongal long *i* in Modern English, e.g., OE *wīd*, *mīl* = Mod. Eng. *wide*, *mile*. Historically the linguistic character of *i* is fairly stable, Indo-Germ. **widhewā*, Skt. *vidhāvā*, 'widow,' Lat. *vidua*, OChurch Slav. *vidova*, AS *widewe*, Eng. *widow*, or Gk. *olvos* (for *Foivos*), 'wine,' Lat. *vinum*, AS *wīn*, Eng. *wine*. For the connection of *i* and *y* see J.

As a Symbol. *I* in the Roman notation stands for 1, in chemistry *I* = iodine, in logic *I* is the symbol of the partial affirmative proposition.

I'ABA'DU IN'SULA (Lat., trans. of Gk. *Ἰαβάδιον Νῆσος*, *Iabadiou Nēsos*). According to Ptolemy (vii, 2), a large island in the Indian Ocean, southeast of the Golden Chersonese and southwest of the Isles of Satyrs, said to be very fertile and to contain much gold. The island meant was probably the modern Java, though Humboldt and others think of it rather as

Sumatra. The name, according to Ptolemy, signified Island of Barley. The capital was named Aigyre ('Αργυρή).

IACCHUS, i-āk'kūs (Lat., from Gk. *Ἰακχος*, *Iakchos*). A title used of Bacchus (q.v.) in the Eleusinian Mysteries (q.v.), in which he was regarded as the son or husband of Demeter, or the son of Persephone. He was thus distinguished from Dionysus, the son of Zeus and Semele, but was sometimes called his son and at times identified with him. Consult J. E. Harrison, *Prolegomena to the Study of Greek Religion* (2d ed., Cambridge, 1908).

IAGO, ē-a'gō. A Spanish and Portuguese form of the name James, now occurring only in the combination Santiago (St. James).

IAGO. In Shakespeare's *Othello*, a calculating and malignant character, the ancient of Othello, whom he secretly hates while retaining his confidence. In revenge for imagined wrongs he skillfully concocts evidence which convinces Othello of the unfaithfulness of his wife, Desdemona. Othello in jealousy murders Desdemona and stabs Iago when the plot comes to light.

IALYSUS (Lat., from Gk. *Ἰάλυσος*). An ancient city on the island of Rhodes, on the west coast, near the northern end of the island, possibly a Phœnician settlement, certainly an important place in the Mycænæan period. It was later colonized by Dorians from Argos and joined with Lindus and Camirus the Rhodian Tripolis. Even in the Homeric poems it is famed for its wealth. In 408 B.C. it united with Lindus and Camirus in the foundation of the city of Rhodes (q.v.). Some remains are still traceable near the modern village Ialiso. A necropolis at Ialysus has yielded many Mycænæan vases and other ornaments.

IAM'BI. The name sometimes given by Horace (q.v.) to the poems commonly called epodes. See EPODE.

IAMBIĆ VERSE (Lat. *iambicus*, Gk. *ιαμβικός*, *iambikos*, from *ἱαμβος*, *iambos*, iambus, from *ἵαμειν*, *iapein*, to assail with words). A term applied in classic prosody to verses consisting of the foot or metre called *iambus*, made up of two syllables, of which the first is short and the second long (—). Archilochus (q.v.) is the reputed inventor of iambic verse. The term is also applied by analogy to English verse wherein unstressed and stressed syllables correspond to a short syllable followed by a long syllable in Latin or Greek verse. The English language runs more easily and naturally in this metre than in any other.

The stég | at éve | had drúnk | his fíll

See **METRE**, **VERSIFICATION**, *Greek and Latin*, *Iambic Rhythms*

IAMBlichus, i-ām'blī-kūs (Lat., from Gk. Ἰάμβλιχος) 1 A Greek writer of the second century A.D., a Syrian by birth, and the author of the earliest Greek romance of which considerable remains have survived. It was entitled *Babyloniaca* and described in 35 books the remarkable adventures of two lovers, Rhodanes and Sinonis. The original romance has perished, but large extracts are preserved by Photius (chap. xciv). Consult Chassang, *Histoire du roman dans l'antiquité* (Paris, 1862), and Rohde, *Der griechische Roman* (1900), and see **PHOTIUS**

2. A Neoplatonic philosopher, born at Chalcis in Coele-Syria about 283 A.D. He lived mostly at Alexandria. He studied under the Neoplatonists Anatolius and Porphyrius and became deeply imbued with the teachings of Plotinus, which he expounded for many years to a large circle of hearers at Alexandria, but with a considerable admixture of his own peculiar views. He died at Alexandria about 330 A.D. His doctrines were a mixture of Pythagorean and Platonic ideas, with much superstition and magic, and the supposed manifestation of God by ecstasies, and a communication with the spiritual world by means of ceremonies. He was a voluminous writer, but most of his writings are lost. Perhaps they were destroyed by the Emperor Constantine, who ordered the burning of the works of Porphyrius. Of his work, *Περὶ Πυθαγόρου Αἰδέσεως*, in 10 books, we possess four complete sections, viz. *On the Life of Pythagoras* (*Περὶ τοῦ Πυθαγορικοῦ Βίου*), edited by Nauck (St Petersburg, 1884), *Exhortation to Philosophy* (*Προπαιδευτικὸν Δόγμα εἰς Φιλοσοφίαν*), edited by Pistelli (Leipzig, 1888), *On Mathematics* (*Περὶ τῆς Κοινῆς Μαθηματικῆς Ἐπιστήμης*), edited by Festa (ib., 1891), and an introduction to the *Arithmetic* of Nicomachus, edited by Pistelli (ib., 1894). There is also in existence a work on *Mysteries* (*Περὶ Μυστηρίων Λόγος*), which is attributed to Iamblichus, but the attribution has been questioned, perhaps without reason. On Iamblichus and his philosophy, consult A. E. Chaignet, *Histoire de la psychologie des Grecs*, vol. v (Paris, 1893), Eduard Zeller, *History of Greek Philosophy* (New York, 1889); T. Whittaker, *The Neo-Platonists* (Cambridge, 1901). See **NEOPLATONISM**

IANTHE, i-ān'thē. 1 In Roman mythology, a girl to whom Iphig was betrothed (Ovid, *Met.*, ix, 12). 2 A character in Sir William Davenant's *The Siege of Rhodes*. 3 Lady Charlotte Harley, to whom, under the name of Ianthé, Byron dedicated his *Child of Harold*. 4 A character in Shelley's *Queen Mab*.

IAPETUS (Lat., from Gk. Ἰαπετός). One of the Titans (qv), son of Uranus and Gæa, father, according to Hesiod, of Atlas, Menæceus, Prometheus, and Epimetheus. Through Prometheus he is ancestor of Deucalion (qv) and so of the human race. He rebelled against Jupiter and so was confined in Tartarus, or under the island Inaime, off the coast of Campania. Many scholars suppose his name to be identical with that of the biblical Japhet; others, like Maximilian Meyer, *Giganten und Titanen* (Berlin, 1887), deny any such connection.

IAPYGLIA, i-a-pij'i-a (Lat., from Gk. Ἰαπυγία). A name given to the southeastern district of Italy, forming the heel of the peninsula, also called Messapia. The name Iapygia was familiar to the Greeks, but was not known to the Romans.

IASI. See **JASSY**

IBA, ē'ba. The capital of the Province of Zambales, Luzon, Philippines (Map Philippine Islands, B 3). It is situated on the Iba River, 85 miles northwest of Manila, and has a post office and telegraph station, fine public buildings, and a town hall. Pop., 1903, 4482.

IBADAN, ē-ba'dan. The chief commercial city of the Yoruba, in the interior of the English colony of Lagos in Nigeria, Africa, 123 miles northeast of Lagos (Map Africa, E 4). It is a walled town, mainly of mud huts, situated on a small river, the Ona. There are many mosques and idol houses. The chief industry is agriculture. Its population is estimated at 150,000, including the people outside the walls.

IBAGUÉ, ē'ba-gá'. Capital of the Department of Tolima, Colombia, situated 60 miles west of Bogotá, on a fertile plain, at an altitude of over 4000 feet (Map Colombia, B 3). It has a temperate and healthful climate and is a prosperous town of considerable commercial importance. There are a number of sulphur and silver mines in its vicinity. Pop., 1912, 23,607. Ibagué was founded in 1550 and was in 1854 the temporary capital of the Republic.

IBAJAY, ē'ba-hí'. A town of Panay, in the Province of Capiz, Philippines, situated at the mouth of the Ibañay River, 43 miles northwest of Capiz. The town formerly stood at the Point of Potoi (Map Philippine Islands, D 5). Pop., 1903, 14,774.

IBALAO. See **ILONGOT**

IBALONE, ē'ba-lō'ná. See **VICOL**

IBANAG, ē'ba-nag'. The speech of the Cagayan people in Luzon. See **PHILIPPINE ISLANDS**

IBÁÑEZ DE IBÁÑEZ DE IBERO, ē-ba/-nyāth dā ē-ba'-nyāth dā ē-bā'rū, CARLOS, MARQUIS OF MULHACEN (1825-91). A Spanish military engineer and geodetist, born in Barcelona. As a result of his work in geodesy and geography, both in Spain and in other countries, he was given the title of Marquis of Mulhacén and was elected to many scientific societies. His publications include *Base central de la triangulación geodésica de España* (1865), *Descripción geodésica de las islas Baleares* (3 vols., 1871), *Tableau géographique et statistique de l'Espagne* (1888).

IBARRA, ē-bar'ra. The capital of the Department of Imbabura, Ecuador, situated at an altitude of over 7000 feet, 60 miles northeast of Quito (Map Ecuador, B 3). It has some cotton and woolen mills and a population of about 10,000. Once a considerable town with a population of about 16,000, Ibarra was almost wholly destroyed by the earthquake of 1868.

IBARRA, JOAQUÍN (1725-85). A Spanish printer, born at Saragossa. He was appointed court printer at Madrid. The following works from his press are among the masterpieces of the art of printing: a translation of Sallust by the Infante Don Gabriel (1772), an edition of Cervantes' *Don Quixote* (4 vols. quarto, 1780, 4 vols. octavo, 1782), the *Historia de España* of Mariana (2 vols., 1780), and several fine editions of the Bible.

I BEAM. See **STEEL SHAPES**.

IBERCOURT, ē'bār'kōōr', HENRY LOUIS D' (1771-1818). A Flemish traveler, born in Mons. His journeyings began in the West India Islands and extended over a great part of South America. His narrations include *L'Amérique dévoilée* (1811), *Voyage en Chili* (1812), *Nouveau traité*

sur les légumineuses de l'Amérique du Sud (1815). He also wrote a romance, *Un voyageur captif en Patagonie* (1814), and a pamphlet, *La constitution des Etats-Unis, est-elle applicable à l'Europe?* (1818), which so deeply offended the Dutch government that the author suffered a short term of imprisonment.

IBERES, i-bé-réz. See **IBERIAN**, **HISPANIA**.

IBERIA. See **HISPANIA**.

IBERIAN LANGUAGE. See **GEORGIAN LANGUAGE**.

IBERIAN MADONNA. A wonder-working picture in the Kremlin, Moscow.

IBERIAN (Lat. *Iberes*, Gk. Ἰβηρες). A people anciently living at the mouth of the Iberus (Ebro) River in eastern Spain. Later the inhabitants of the entire peninsula were so called. The term is now applied to the primitive Neolithic and Bronze-age men whose remains and relics are found in ancient graves, grottoes, and refuse heaps throughout western Europe. Their ovoid and ellipsoid crania, called Pelasgic type by Sergi, resemble those of ancient Italy, Greece, Asia Minor, Egypt, Ethiopia, and north Africa, belonging to what he denominates the Mediterranean race. Keane also quotes Von der Gabelentz in the proof of identity between the Basque (Iberian) and the Berber speech. This long-headed man, of low stature, has been traced as far as the British Isles and is identified with the Picts and other groups. The term Iberian is used by English ethnologists for the Mediterranean race, and Deniker's title for the same group is Ibero-Insular. Keane subdivides the historical Iberian (Basque) as follows. The descendants from old extinct Iberian are

Euscara (Spanish Basque)	{ Gupuzcoan Biscayan, or Upper Navarrese North Upper Navarrese South
Basconse (French Basque)	{ Labordin Souletin, or Lower Navarrese East Lower Navarrese West

Consult Keane, *Man Past and Present* (Cambridge, 1899), and Sergi, *Mediterranean Race* (London, 1901). See **MEDITERRANEAN RACE**.

IBERIS. See **CANDYTUFT**.

IBERUS. The ancient name of the river Ebro (qv).

IBERVILLE, é-bâr-vél'. A town and the county seat of Ibergville Co., Quebec, Canada, on the Richelieu River, and on the Canadian Pacific, the Quebec, Montreal, and Southern, the Central Vermont, and the Rutland railways (Map Quebec, E 5), opposite the town of St John's, and about 40 miles southeast of Montreal. Its manufacturing establishments include two iron factories, three potteries, two agricultural-implement factories, monument works, and a carriage factory. Pop., 1901, 1512, 1911, 1905.

IBERVILLE, PIERRE LE MOYNE, SIEUR D' (1661-1706). A French-Canadian soldier, naval commander, and explorer, founder of Louisiana. He was one of the 10 famous sons of Charles le Moyne of Montreal. He studied seamanship in the French navy, but his first exploits were inland—from the Ottawa north to James's Bay, with an expedition destined to gain possession of the English forts there (1686). He took part in the expedition for the destruction of Schenectady (1690). After capturing (1696) and demolishing the stone fort at Pemaquid, built to protect New England, Ibergville thought of taking Boston, but sailed instead to Newfoundland,

where he burned the village of St John's, laying waste all the British settlements on the island. Thence he steered for Hudson Bay, where he had a gallant victory over three English ships against his one and destroyed the last remaining post of the Hudson's Bay Company. From the Far North he went to the Far South, sailing from France (1699) to the Gulf of Mexico in search of the mouth of the Mississippi, found it, and built a fort at Biloxi (qv), changing afterward to Mobile, thus fulfilling La Salle's dream of planting a French colony on the Gulf. He left Canada in 1702 and was made a captain in the French navy. In 1706 he was placed in command of a small fleet and went on a cruising expedition. When in the West Indies, he was taken ill and went to Havana, where he died.

IBEX (Lat. *chamois*). The ancient name of the steinbock of the Alps, and now designating a section or subgenus of goats having the horns flat and marked with prominent transverse knots in front, whereas those of the typical goats are compressed and keeled in front and rounded behind. The group contains four species, all inhabitants of high mountainous regions, as described below. All are characterized by a nearly uniform coloration, but the hue varies with age and season, from gray, yellowish, or grizzled, to various degrees of brown, usually lighter on the throat, belly, and inside of the legs than elsewhere. The short summer coat is exchanged in winter for a longer, warmer one, mixed with an under wool. The pairing season of all is in mid-winter, and the kids, usually two, are born in early summer. Cf. **GOAT**, and see **PLATE OF WILD GOATS**.

The typical ibex (*Capra ibex*), called bouquetin by the French, and steinbock by the Germans, has long been exterminated as a wild animal, but is preserved by the Italian government in a few valleys of the Piedmontese region. Formerly it seems to have roamed all over the Alps of Switzerland, Savoy, and the Tirol, but always kept as high as possible, seeking its food, mainly by browsing bushes, at the edge of the snow, and not descending the valleys as does the chamois. Though larger and more powerful than the common goat, it is smaller than the other ibexes. The horns rarely exceed 30 inches in length and have the knobs not prominent, while the beard of the males is so small as to be hardly visible in the summer coat. This ibex is easily tamed when taken young and interbreeds readily with domestic goats.

The Himalayan ibex (*Capra sibirica*) is still numerous and well known to sportsmen. A ram stands 40 inches high at the withers, has a heavy beard, and the roughly knobbed horns often measure more than 50 inches along the outside curve and 11 to 12 inches in greatest girth. It inhabits all the mountain ranges of Central Asia from the borders of Persia eastward to the frontier of Tibet and northward into Siberia, and is found not only on the summits, but on the open plateaus of the Pamir. Ordinarily, however, ibexes remain upon the crags as near as possible to the snow line. They descend in winter only so far as is necessary to find uncovered pasturage and often linger at that season at great altitudes, where the wind sweeps steep slopes and allows them to nibble a scanty subsistence from the withered herbage. The resistance to cold and hardness of constitution generally which this implies are characteristic of the race. They usually go about in small bands, led by old rams,

but sometimes gather into herds of 100 or more. In the spring the males separate from the band and betake themselves to the highest crags, while the females seek retired places in which to bring forth their young. In spite of constant pursuit by hunters, the ravages of wild dogs, and destruction by avalanches, these animals seem to maintain their numbers (except near Kashmir), as they are prolific and accustomed to wandering widely. Ibex shooting is one of the most exciting and difficult feats offered to the sportsman, because of the nature of the country in which the animals live and their extreme wainness and ability to escape down precipices and over crags which baffle their pursuers. The books of men like MacIntyre, Kinloch, Markham, Pollok, and other Anglo-Indian sportsmen are full of entertaining accounts of this adventurous hunting, and to these observers we owe most of our knowledge of the haunts and habits of these animals.

The Arabian ibex (*Capra sinaitica*), or bedouin, occupies the rough heights of the Sinaitic Peninsula, Arabia Petraea, Palestine as far as Lebanon, and Upper Egypt. It is rather smaller than the Himalayan, and the knobs on the front of the horns are less prominent and regular. An Abyssinian species, the walia (*Capra walia*), also exists, and differs from the others in the curvature of its horns and a protuberance in the centre of the forehead.

IBILAO, ʔʔʔʔʔʔ See ILONGOT

IBIS (Lat. *ibis*, Gk. *ibis*, of Egyptian origin).

A storklike bird of the family Iridæ. The bill is long, slender, curved, thick at the base, the point rather obtuse, the upper mandible deeply grooved throughout its length. The face, and generally the greater part of the head, and sometimes even the neck, are destitute of feathers, at least in adult birds. The neck is long. The legs are rather long, naked above the tarsal joint, with three partially united toes in front and one behind, the wings are moderately long, the tail is very short. The family is usually ranked with the storks in the same order as the herons, but there are important points in which the ibises approach the curlews. The sacred ibis, or Egyptian ibis (*Ibis æthiopica*), is an African bird, 2½ feet in length, although the body is little larger than that of a common fowl. The glossy ibis (*Plegadis*, or *Egathens, falcinellus*) is a smaller species, also African, but migrating northward into continental Europe and occasionally seen in Great Britain. It occurs in the tropical and subtropical parts of all the world, but is quite uncommon in North America, where ornithologists call it *Plegadis autumnalis*. In the southwestern United States it is replaced by the white-faced glossy ibis (*Plegadis guarauna*), a species in which the adults have the region about the base of the bill white. The habits of both species resemble those of the sacred ibis. The color is black, varied with reddish brown and exhibiting fine purple and green reflections. There are no loose pendent feathers. The white ibis (*Guara alba*), a species with pure white plumage, abounds on the coasts of Florida and is locally abundant as far north as South Carolina and southern Illinois. Audubon saw multitudes on a low islet and counted 47 nests on a single tree (For its egg, see Colored Plate under Egg). The scarlet ibis (*Guara rubra*) is a tropical American species, remarkable for its brilliant plumage, which is scarlet, with the tips of a few outer primaries glossy black. The straw-necked ibis (*Orphibis spinicollis*) is a large

Australian bird of fine plumage, remarkable for stiff, naked, yellow feather shafts on the neck and throat, which look extraordinarily like bits of straw. The bird known in the southern United States as wood ibis is not an ibis at all, but a stork (q.v.).

The sacred ibis, one of the birds worshiped by the ancient Egyptians and called by them *hab* (or *hib*) and by the modern Egyptians *abu-Hannes* (i.e., Father John), is a bird with long beak and legs and is covered with black and white plumage. It was supposed, from the color of its feathers, to symbolize the light and shade of the moon, its body to represent the heart, its legs described a triangle, and with its beak it performed a medical operation, from all which esoteric ideas it was the avatar of the god Thoth, or Hermes (see MERCURY), who escaped in that shape the pursuit of Typhon, as the hawk was that of Ra, or Horus, the sun. Its feathers were supposed to scare, and even kill, the crocodile. It appeared in Egypt at the rise, and disappeared at the inundation, of the Nile, and was thought at that time to deliver Egypt from the winged and other serpents which came from Arabia in certain narrow passes. As it did not make its nest in Egypt, it was thought to be self-engendering, and to lay eggs for a lunar month. According to some, the basilisk was engendered by it. It was celebrated for its purity and drank only from the purest water, and the most strict of the priesthood drank only of the pools where it had been seen, besides which it was fabled to entertain the most invincible love of Egypt and to die of self-starvation if transported elsewhere. Its flesh was thought to be incorruptible after death, and to kill it was punishable with death. Ibises were kept in the temples and unmolested in the neighborhood of cities. After death they were mummied, and there is no animal of which so many remains have been found at Thebes, Memphis, Hermopolis Magna, or Eshmun, and at Ibru, or Ibeum, 14 miles north of the latter place. They are made up into a conical shape, the wings flat, the legs bent back to the breast, the head placed on the left side, and the beak under the tail. They were prepared as other mummies and wrapped up in linen bandages, which are sometimes plaited in patterns externally. At Thebes they are found in linen bandages only, at Hermopolis, well preserved in wooden or stone boxes of oblong form, sometimes in form of the bird itself or the god Thoth, at Memphis, in conical sugar-loaf-shaped red earthenware jars, the tail downward, the cover of convex form, cemented by lime. There appear to be two sorts of embalmed "ibises"—a smaller one of the size of a rail, very black, and the other black and white. The former is not an ibis at all, but some smaller wading bird. The last is usually found with its eggs, and with its food in its stomach. By the Jews it was held to be an unclean bird. Consult Pettigrew, *History of Egyptian Mummies* (London, 1840), Wilkinson, *Manners and Customs of the Ancient Egyptians* (New York, 1879); Whymper, *Egyptian Birds* (London, 1909). See Colored Plate of Eggs.

IBIZA See IVIZA.

IBLIS One of the names of the Devil, in the Koran, who, however, is more often called *Shaitān* (Satan). Iblis is the chief of the fallen angels, who was once a good angel named Azazel, but, having refused at God's command to render homage to Adam, was first condemned to death,

but subsequently respite till the judgment day (Koran, vii, 13). The legend is borrowed from Jewish sources and is embodied in the Midrashic exposition of Genesis, iii (consult Wunsche, *Midrash Bereshit Rabba*, pp 32 et seq., Leipzig, 1881). Both words for devil used by Mohammed appear to be of foreign origin, the form *Shaitān* coming close to the designation of Satan in Ethiopic, while *Iblis* may be a distortion of *diabolus*, modified in order to adapt it to a derivation from an Arabic stem *balasa*, 'to confuse,' with which, however, it has really nothing to do. Of the two terms, the former is found in the Koran 87 times, the latter only 11 times. Moreover, the plural of the former is used, whereas the latter occurs only in the singular, and was regarded by Mohammed as a name for a specific devil, the arch devil spirit, *Shaitān*, both in the Koran and the later literature, is used as a general designation for devils or evilly disposed demons. On the basis of the utterances in the Koran, the doctrine of the Devil is further developed in Mohammedan theology, influenced by the specifically Christian and Jewish conceptions current in the Orient whereby the Devil, as a single personage, usurps the powers and attributes of the numerous body of jinn (qv) of popular belief. The latter, however, as a survival of primitive religion, continue to hold sway among the people in general, so that in the folklore of the Arabs it is the jinn who are constantly introduced, both for good and evil purposes, whereas the mention of Iblis and of the Satans is largely confined to the body of theological writings. In the latter the contrast between the Devil and the angels is prominently put forward, and the view is expressed that each individual has a devil and an angel appointed as his companions—the former tempting him to evil deeds, the latter prompting him to good. The life of man passes in a constant struggle to be rid of the former and to keep close to the latter. Consult Weil, *Biblische Legenden der Muselmanner* (Frankfurt, 1845).

IBN ABI USEIBIA, ib'n a'bē ō-sā'bē-a, MUWAFFAK AD-DIN (1203-70). An Arabic physician and author. He was born in Damascus, of a family of physicians, lived in Egypt and Syria, and was educated at Damascus and Cairo (1227-33). For two years he was head of a hospital at Cairo, then he became court doctor to a Syrian emir near his home city. He is best known for his biographical lexicon of Mohammedan physicians (1245-46), which has been edited by August Muller (Königsberg, 1884) and commented on by the same in *Ueber Ibn Abi und seine Geschichte der Aerzte* (Leyden, 1885). Consult Wüstenfeld, *Geschichte der arabischen Aerzte und Naturforscher* (Göttingen, 1840), Leclerc, *Histoire de la médecine arabe* (Paris, 1876), *Travaux de la VIème session du Congrès international des Orientalistes à Leide*, vol II (Leyden, 1884).

IBN AL-ATHIR, ib'n al-a-tēr', IZZ-AD-DIN AL-JAZARI (1160-1234). An Arabic historian, who was born of good family in Mesopotamia and lived in Mosul. He wrote *Kamil*, a history of the world to the year 1231, edited by Toinberg under the title *Ibn-el-Athir Chirmonon quod Perfectissimum Inscriptur* (1851-76), *Usd al-ghāba*, on the successors of Mohammed (1864), and a lexicon, edited by Seybold (Weimar, 1896). Excerpts from his other works may be found in Reinaud, *Historiens des croisades* (Paris, 1829).

IBN AL KHATIN. See FAKHR-AD-DIN

IBN AL KIFTI. See KIFTI

IBN ARABSHAH, ib'n a'rab-sha', AHMED (1392-1450). An Arabic author, born at Damascus. He was carried captive with his family (1400) to Samarkand, after the invasion of Syria by Timur, took advantage of this opportunity to study Turkish and Persian, traveled through Mongolia and Astrakhan, and at Adrianople was employed by the Sultan to translate Arabian writings into Turkish and Persian. The most important of his works is the history of Timur or Tamerlane and his period (last ed, Calcutta, 1818). The book of anecdotes written by him has been published by Freytag, with a Latin translation, under the title *Fructus Imperatorum et Jociatio Ingeniosorum* (2 vols, Bonn, 1832-52).

IBN BAJJA, ib'n ba'ja. See AVEMPACE

IBN BATŪTA, ib'n ba-tū'ta, ABU ABDALLAH MOHAMMED (1304-77). The greatest Mohammedan traveler of all time. He was born at Tangier, Morocco, and spent 25 years (1325-50) in traversing western and Central Asia, large portions of Africa, Russia, India, China, and Spain. For three and one-half years he acted as cadī at Delhi and in the Maldives Islands. After his travels he settled in Morocco. His narrative of his journeys, replete with graphic and picturesque description, has been published in the French translation by Defrémery and Sanguinetti (Paris, 2d ed, 1874-77). There is an English translation from an epitomized version by S Lee (1829).

IBN DORĀID, ib'n dō-rā'ed, MOHAMMED (837-934). An Arabic poet and scholar, born at Basra, and later resident in Oman, Persia, and Bagdad. His most famous poem is the elegy entitled *Alkasida-al-Maksura*, dealing with the question of good luck and bad. Among his philological works may be mentioned an etymological and genealogical dictionary of Arabic proper names, edited by Wüstenfeld (1853-54), and two briefer studies in lexicography, edited by Thorbecke (1882).

IBN EZRA, ib'n-ēz'ra. See ABEN-ESRA

IBN FARĪD, ib'n fa-rā'id', ABU' KASIM UMAIY (1181-1235). An Arabian poet. He was born in Cairo, lived for some time in Mecca, but died in his native city. While his poetry has been admired for its subtlety and beauty, it is especially as a mystic, a representative of Sufism, that he has exercised a considerable influence. His *divan* (qv) was published at Benut in 1887, it has also been published with the commentaries of Burini, in 1615, Abdu'l Ghani, in 1853, and Rushayyad Ghitab in 1893. One poem was edited by Hammer-Purgstall under the title *Das arabische Lied der Liebe* (Vienna, 1854). Consult Nicholson, *A Literary History of the Arabs* (London, 1907).

IBN HANBAL, ib'n han'bāl, ABU ABDALLAH AHMED (780-855 A.D.). The founder of the fourth orthodox sect of the Sunnites. He was born at Bagdad, but his parents came from Merv. He was instructed there by Al Shafi'i. In the dispute as to whether the Koran was eternal or had been created Ibn Hanbal maintained the former opinion, which incensed against him the Caliph al Mutasim. He was imprisoned in 842 and, it is said, scourged. Al Mutawakkil, however, issued an edict of toleration in 846, and Ibn Hanbal was set free and offered a compensation for his sufferings. Thousands listened to his lectures, and his great work,

the Musnad, containing some 30,000 traditions selected from a much larger number, has had a great influence. He emphasized strongly tradition and rejected absolutely subjective decisions. Ibn Hanbal himself is probably not to be held responsible for the doctrine that Allah had set Mohammed on his throne, which has been widely spread among the Hanbalites. The influence of his school is very slight at the present time. Consult Brockelmann, *Geschichte der arabischen Literatur*, 1, 181 (Weimar, 1898). See MOHAMMEDAN SECTS.

IBN HISHAM, ib'n hê-sham', ABU MOHAMMED ABD AL-MALIK (c760-834). An Arabic scholar of Fostat. He is famed for his genealogical writings and his revision of the life of the Prophet Mohammed, written by Ibn Ishak (c700-768). The biography was edited by Wustenfeld (Göttingen, 1858-60), and translated into German by Weil as *Das Leben Mohammeds* (1864).

IBN JANACH, Eb'n ha-nach', ABULWALID MERWAN, or JONAH MABINUS. A Jewish grammarian of Spain. He was born near the end of the tenth century and died about the middle of the eleventh century, but the exact dates are unknown. He studied Hebrew at his birthplace, Cordova, and in Lucena, under Jewish teachers, and also took up the study of medicine. In 1012, in consequence of political disturbances, he was obliged, with many other Jews, to leave Cordova and settled in Saragossa, where he appears to have spent the rest of his days, and where, while continuing his practice of medicine, he devoted himself also to the investigation of Hebrew grammar, guided largely by the researches of his predecessor, Hayyug (qv). Ibn Janach was enabled to advance the knowledge of Hebrew morphology far beyond the point that Hayyug had reached. He did not hesitate to make slight changes in the biblical text where it seemed to be meaningless as it stood. His main work consists of two parts—the first dealing with grammar, *Kitâb-al-Luma*, published by J. Derenbourg (Paris, 1886); the second a lexicon, *Kitâb-al-'Usûl*, published by Neubauer (Oxford, 1873-75). The grammar, based on Arabic models, is the first systematic attempt to cover the entire field of Hebrew grammar. The dictionary is characterized by the same comprehensive knowledge and clear perception as the grammar and, incidental to the explanation of words, furnishes valuable and elaborate discussion of grammatical points. Both the grammar and the dictionary were translated by Judah ben Saul Ibn Tibbon (c1120-90)—the former having been published by B. Goldberg (Frankfort, 1856), the latter by W. Bacher (Leipzig, 1889). He also wrote several minor grammatical treatises (published by J. and H. Derenbourg, Paris, 1880), in which he defended his views and those of Hayyug against attacks and also amplified the grammatical treatises of the latter. Ibn Janach was also interested in philosophical questions and strenuously opposed the speculations of Ibn Gabirol and other men of the day on the relation of God to the world, on the ground that they led to unbelief. Consult Bacher, *Leben und Werke des Abulwalid Merwan ibn Ganach* (Leipzig, 1885).

IBN KHALDUN, ib'n kal-dûn', ABD AL RAHMAN (1332-1406). The greatest of Arabic historians and one of the profoundest students of the philosophy of history in all ages. He

was born at Tunis, of a family that had long lived at Seville, but originally came from Hadramaut. Among his ancestors were many eminent men, soldiers, administrators, philosophers, and writers. He early entered the public service, first in Tunis, then at Fez and Tlemcen. In 1362, under the Sultan of Granada, he carried on negotiations for peace with Pedro of Castile, in 1374 he was imprisoned for political reasons in a castle in northern Africa, where he spent his time in historical research, but was permitted to return to Tunis in 1378. Here he finished his famous introduction and wrote the history of the Berbers. In 1382 he set out for Mecca, but remained three years in Egypt, where he gained great favor with the Mameluke rulers and was appointed as cadî at Cairo. After his pilgrimage he returned to Egypt and frequently held judicial positions, though his opposition to the bribery, violence, and wrongdoing of powerful officials often deprived him of his place. In 1400 he was sent as an envoy to Timur, then besieging Damascus. Timur was deeply impressed with the knowledge and wisdom of the great historian. The last years of his life he spent in Egypt, and he held the position of cadî when he died. He was the first among the Arabs to leave the annalistic method, and the first historian to examine carefully the influence of the physical environment, the occupations it indicated for men, the food supply, the manner of life, the religious ideas, on the development of states and empires. He called attention to the differences between nomadic, agricultural, and city life, and pointed out the strength and weakness of each. The enthusiasm created by a universal religion appeared to him to be the sole force that could neutralize the tribal instincts and lead to empire building. Surveying the history of the Moslem world for more than seven centuries, observing the growth and decay of caliphates and sultanates, searching for the deeper-lying causes of progress and arrest, considering the religious ideas, sentiments, and institutions as factors in the building up of social and political organisms—he learned a new method of approach to all historical phenomena and realized himself that he had discovered a new science. His greatest contribution is the *Introduction to History*, edited by Quatremère (Paris, 1858) and translated into French by De Slane (Paris, 1862-68). In this voluminous work he lays down his fundamental conceptions of what the historian's task involves. Centuries passed before the Western world, ignorant of its existence, produced a work in this field worthy of a place beside it. A part of his *History of the Eastern Caliphate* was edited with a Latin translation by Tornberg under the title *Ibn Khaldun Narratio de Expeditionibus Francorum* (1840), and the *History of the Berbers* was edited and translated into French by De Slane (Paris, 1862), the publication of a new French translation, with introduction, was begun in 1914. Ibn Khaldun's style is often prolix and obscure, it is by the weight of his ideas, his critical insight, his questioning of the sources, and his breadth of view, rather than by literary power and elegance, that he evinced his mastery and holds the attention. Consult Alfred von Kremer, *Ibn Khaldun und seine Kulturgeschichte der islamischer Völker* (Vienna, 1879), A. Muller, *Islam im Morgen und Abendland*, vol. II (Leipzig, 1886), Carl Brockelmann, *Geschichte der*

arabischen Literatur, vol II (ib, 1893), R A Nicholson, *A History of Arabic Literature* (Cambridge, 1907), C I Huart, *Histoire des arabes* (Paris, 1912)

IBN KHALLIKAN, ib'n ka'lê-kan', SHAMS AL-DIN AHMED (1211-82). An Arabic historian and biographer, born at Arbela, of the family of the Barmecides. He held important offices, both civil and educational, in Cairo and in Damascus, where he died. His most important work is a biographical dictionary, a very important source of knowledge of Arabian literature and its history from the eighth century to his own time. It is edited by Wustenfeld (Göttingen, 1840-65) and translated into English by MacGuckin de Slane (4 vols, London, 1842-71).

IBN KUTAIBA, ib'n kû-ta'ê-ba, ABDALLAH (828-c 889). An Arabic philologist and historian. He was born probably at Bagdad or Kufa and for some time held high judicial offices at Dinawâr. Later he was a teacher in Bagdad and died there. Of his works, the most important are *Adab al-Kâtib*, mainly philological and of great value on literary style and on antiquities, of which Sproull published a part as *An Extract from Ibn Koteiba's Adab al-Kâtib* (1877) and which was edited by Grunert (1900), a collection of biographies of the Arabian poets, published by De Goeje (Leyden, 1904), *Kâtib al-ma-Arif*, an outline of history for practical use, edited by Wustenfeld (1850), and *Uyun al akhbâr*, a treatise upon government, war, nobility, character, science, friendship, food, women, and other topics, edited by Brockelmann (Weimar, 1898).

IBN ROSHD, ib'n rôsh't. See AVERROES.

IBN SAYIGG, ib'n si-eg'. See AYEMPAACE.

IBN SINA, ib'n sê'na. See AVICENNA.

IBN TOPHAIL, ib'n tô'fa-el. See ABU-BEKR MOHAMMED IBN TOPHAIL.

IBN TUMART, ib'n tô'ma'it, MOHAMMED (?-1128 A D). The founder of the sect of the Almohades (qv). He was born in the Deren Mountain in the Province of Sus in southwest Morocco, probably in the last third of the eleventh century. In 1107 he went to Cordova, then to Mecca for the pilgrimage, and to Bagdad, where he studied theology from the standpoint of the Asharite school. It is not probable that he came into personal contact with Ghazali (qv), but he was obviously influenced by him. After his return to Africa he preached at Tripolis and Bougie his doctrine of unity. He opposed both the anthropomorphic views of Allah held by many orthodox Moslems and the allegorical exegesis by which the references to Allah's mouth, face, hands, and feet were explained by the Mutazilites as denoting abstract qualities, emphasized the unity of the divine being, denounced as idolaters those Moslems who held the current opinions, and made the Almoravides responsible. His criticism of the government led to his expulsion from Bougie in 1118, and in 1121 he openly declared himself to be the Mahdi, as Ubaidallah, the founder of the Fatimid sect, had done before him. Essentially he remained a Sunnite, but of the Shiite doctrines he accepted that of the infallibility of the Imam. As Mahdi, he felt himself to be called by Allah to check unrighteousness and destroy error and therefore to wage war against the government that supported what he regarded as idolatry. After his first successes he made Tin Mallal his capital, the ruins of this city

were discovered in 1901 by Edmond Doutte. He died probably, as Ibn Khaldun states, in 1128. Ibn Tumart seems to have maintained to the end consistently the ascetic mode of life that won for him so many adherents among the Berber tribes, his was evidently an intense religious nature, his works show an eager study of the Koran and the traditions, and also much sound practical wisdom. His destruction of wine jars and musical instruments may have been due to conviction. Nevertheless his sincerity has been seriously questioned, particularly on the ground that he is said to have claimed miraculous power (though this is not certain), that he declared himself a descendant of Ali, and that he used his theological definitions as a means of justifying a war upon fellow Moslems and as a cloak for his personal ambition. He has been compared with Abd al Wahhab, but whether the charges brought against his character can be fully sustained or not, he does not seem to have possessed the moral integrity and genuine prophetic fervor of the founder of the Wahabite sect. Consult A. Muller, *Der Islam*, II, 640 ff. (Berlin, 1887), Goldziher, *Mohammed ibn Tountart et la theologie de l'Islam dans le Nord de l'Afrique au XIe siècle*, which appeared as an Introduction to Luciani, *Le livre d'Ibn Tountart* (Algiers, 1903), A. Bel, *Les Benou Ghanya* (Paris, 1903), id., article "Almohaden," in *Enzyklopädie des Islam* (Leyden, 1910).

IBN ZOAR, ib'n zôr, or IBN ZUHR. See AVENZOAR.

IBOS, ê'bôz. Dominant negro people of the Niger Delta. Their number is estimated at about 3,000,000. Slaves from this region formerly were called Ibo. Their language is akin to the Ewe and the Tshi. Consult N. W. Thomas, *Anthropological Report on the Ibo-Speaking Peoples of Nigeria* (3 vols, London, 1913).

IBRAHIM, ê'bra-hêm' (1615-48). An Ottoman Sultan, third son of Ahmed I. On the death (1640) of his brother, Amurath IV, whose cruelty he had escaped by feigning madness, he came to the throne. In 1645 he attacked the island of Crete, which was then under the control of Venice, but did not live to finish this war, which was the result of an intrigue in his harem. His government was so cruel and the taxes so oppressive that in 1648 the Janizaries rebelled and strangled him.

IBRAHIM OU L'ILLUSTRE BASSA, ê'bra'hêm', ôô lê'lus'tr' ba'sa'. A romance by Mademoiselle de Scudéry, originally published under the name of her brother (1641).

IBRAHIM PASHA, ê'bra-hêm' pa-sha' (1789-1848). An Egyptian general. He was the adopted son of Mehmet Ali (qv), Governor and subsequently Viceroy of Egypt, and was born at Kavala in the Province of Saloniki in European Turkey. In 1816 he took charge of the army in Arabia and in the course of three years overthrew the Wahhabi power in western Arabia and in Nejd. During the War of Greek Independence he was dispatched at the head of a powerful fleet and a finely disciplined land force to the aid of the Turks in the Morea. In 1825 he stormed Navarino and Tripolizza and in the following year took Missolonghi after a long siege. The destruction of the Turkish-Egyptian fleet in the harbor of Navarino (qv), Oct 20, 1827, and the landing of a French force, led to the evacuation of the Morea by Ibrahim

in September of the following year. As the result of a dispute with the Pasha of Acre, an Egyptian army under Ibrahim invaded Syria in 1831, stormed Acre, May 27, 1832, and defeated the Turkish forces at Homs, Beilan, and Konieh. By the Treaty of Kutayah, May 6, 1833, Mehemet Ali received possession of Syria, while Ibrahim was made Governor of Cilicia. War with the Porte broke out again in 1839, and on June 24 of that year Ibrahim overwhelmed the Turkish army at Nisib, near the Euphrates. Only the interference of the Great Powers saved the Porte from the victorious armies of Mehemet Ali. Ibrahim was forced to evacuate Syria in 1840 and to return to Egypt, suffering the most severe hardships on his march through the desert. He died at Cairo, Nov. 10, 1848, after acting for some months as Regent during the incapacity of Mehemet Ali. His son, Ismail Pasha (qv), subsequently became Khedive of Egypt.

IBRAIL, ē-bra'el. See BRAILA.

IBSAMBUL, ip'sam-būl'. A noted group of ruins on the Nubian Nile. See ABU-SIMBEL.

IBSEN, ih'sen, Dan ip'sen, HENRIK (1828-1906). A Norwegian dramatist, who strongly influenced German, French, English, Italian, and Scandinavian literatures. He was born at Skien, March 20, 1828. His great-grandmother was Scotch, his grandmother and mother German, his grandfather's grandfather Danish. They were a family of shipmasters. His father, Knud Ibsen, a merchant, met with reverses in Henrik's boyhood, which compelled the youth to pass six years (1836-42) in great poverty. In the latter years of this period he attended a scientific school at Skien, and late in 1843 he became an apothecary's apprentice at Grimstad, where he remained till 1849, writing a *Catiline*, a drama in four acts (published at Christiania in 1850 under the pseudonym Brynjolf Bjarme, revised ed., 1875), and some poems. He now sought the University of Christiania to study medicine, but in 1850 he was diverted by the successful production at Christiania of his *The Warrior's Mound* from academic studies to the drama. In 1851 he helped to found a short-lived weekly, *The Man* (later called *Andhrumner*), in which appeared his political satire, *Norma*, poems, and critiques. In November he was appointed by the violinist, Ole Bull, stage manager at Bergen, with leave of absence for five months, on a small stipend, to study the art he was to practice. These he spent in Copenhagen and Germany, writing the unsuccessful and unpublished *St John's Night*. In 1856 *The Feast at Solhoug*, the first of his national dramas, was produced in the theatrical centres of Norway and Sweden. It won him enthusiastic applause and national renown. In 1857 he became director of the Norwegian Theatre at Christiania, but five years of his management reduced it to bankruptcy. Here were produced *Lady Inger of Ostråt*, a saga drama (1855), *The Warriors in Helgeland* (1857), and *Love's Comedy* (1862). In this period he wrote also the longest of his minor poems, *On the Mountain Plains* (1860), and the admirable seafaring romance *Terje Viken* (1861). In 1862, after the bankruptcy of the theatre, Ibsen accepted from the university small grants for researches in folklore and in 1863 petitioned the Storting for the poet's pension (about \$450). He received in 1863 a traveling scholarship and the pension in 1866. Meantime, embittered by

delay and the political situation, he left for Rome in April, 1864, whence he sent back (1866) the social satire, *Brand*. In 1868 Ibsen left Rome for Dresden, where he remained till 1874. He visited Munich, Copenhagen, and Stockholm, and in 1869, on invitation of the Khedive, he was present at the festivities on the opening of the Suez Canal, where he wrote the poem *At Port Said*. After a voluntary exile of 10 years he went back to Norway. In 1891 Ibsen made Christiania his home. On his seventieth birthday the poet dramatist received gifts and world-wide greetings. A bronze statue of him was set outside the new National Theatre in September, 1899. He died at Christiania, May 23, 1906.

Besides the dramas above named, Ibsen's works include *The Pretenders* (1864), an historical drama, *Brand* (1866) and *Peer Gynt* (1867), dramatic poems, *The League of Youth*, a political comedy (1869), the bulky twofold historical drama, *Emperor and Galilean* (1873), and, beginning with 1877, the yet better-known series of dramas that are more characteristic of what passes for Ibsenism: *The Pillars of Society* (1877), *A Doll's House* (1879), *Ghosts* (1881), *An Enemy of the People* (1882), *The Wild Duck* (1884), *Rosmersholm* (1886), *The Lady from the Sea* (1888), *Hedda Gabler* (1890), *The Master-Builder* (1892), *Little Eyolf* (1894), *John Gabriel Borkman* (1896), *When we Dead Awaken* (1900). Ibsen's dramatic work had been at first romantic. This phase culminated in *The Feast at Solhoug*. Then it was historic, but still romantic, up to the *Warriors in Helgeland*. Next the psychological interest becomes prominent, and with it a tendency to social satire very marked in *Love's Comedy*, a masterpiece of swift action and of biting irony. The dramas from 1864 to 1867 are polemically national rather than social. *The League of Youth* marks the transition from political to social interests. From this time on Ibsen is a pathologist of social ills, dealing with conditions which are universal to modern life and thus winning an ever-widening cosmopolitan audience. The best edition of Ibsen in English is *Collected Works* (13 vols., New York and London, 1909-12), revised, edited, and in part translated, by William Archer, the English dramatic critic. William Archer, be it said, began as early as 1878 to be Ibsen's apologist, and he continued his stout and victorious champion. He had for years to face a band of critics as hidebound as the critics in Ibsen's own country had shown themselves, whose unreasoned violence and virulence were amazing. English dramatic literature is deep in the debt of Mr. Archer for the new inspiration and new point of view, giving rise to a new school of dramatists, that followed the ultimate acceptance of Ibsen's work in England, as it is in the debt of Bernard Shaw, whose free-lance championship of Ibsen, in *The Quincentessence of Ibsenism* (1893, and, completed to Ibsen's death, 1913) and in a shower of brilliant dramatic criticisms, put him in the front rank of the champions of the Scandinavian drama of ideas who were soon to triumph. By some Ibsen's work was assailed as immoral, cynical, pessimistic, unfit to be seen or read, by others it was hailed as a new gospel of truth and emancipation. It is not wholly either. The plays are studies in human responsibility under modern social conditions, which in many points Ibsen considers danger-

ously diseased and as threatening the whole body with a gangrene. So he has become the poet of protest, the unveiler of sophistries, the scourger of hypocrites. He writes of vice, but it is with loathing. He lays bare the cause of evils, but leaves it to others to prescribe the remedy.

Leaving the moral question aside, these social dramas mark a new stage in the evolution of dramatic art. They are dramas of descending, not ascending action—not of preludes, but of consequences. The plays are thoroughly realistic, absolutely unconventional. Their dialogues are so natural as to give the illusion of real though fascinating conversation which the playwright allows his audience to overhear. It would be hard to match them in any literature. Hence their power has been felt throughout the dramatic and literary world, while the realistic dramas of the French naturalistic school, of the Goncourts and Zola, have been regarded with languid curiosity as the products of artistic theory. Ibsen's influence has not been so widespread in the United States, however, as in Europe. The editions of his works are very many, but the final and standard text is found in his *Complete Works (Samlede Verker)*, with bibliography by J. B. Halvorsen (10 vols., Copenhagen, 1898–1902). Ibsen's writings are translated into most languages of the civilized world. For Ibsen's life and writings, consult Brandes, *Ibsen, Bjornson* (New York, 1882), Wicksteed, *Four Lectures on Ibsen* (ib., 1892), Jaeger, *Henrik Ibsen. A Critical Biography* (Chicago, 1894), Boyesen, *Commentary on the Writings of Henrik Ibsen* (New York, 1894), G. Grau, *Henrik Ibsen, 1828–98* (Bergen, 1898), Archer, "The Real Ibsen," in *International Monthly* (London, 1901), *Letters*, translated by Laurvik and Morison (New York, 1905), Wagner, *Henrik Ibsen* (Copenhagen, 1907), E. Gosse, *Life of Henrik Ibsen* (London, 1908), J. Bing, *Henrik Ibsen* (Copenhagen, 1909), *Efterladte Skæfter* (3 vols., Christiania, 1909), L. C. Nielsen, *Mundskrift over Ibsen's Forlægger, Fr. Hegel*, with letters (Copenhagen, 1909, 1st ed., 1913), Shaw, *Quintessence of Ibsenism* (New York, 1909); O. Heller, *Ibsen. Plays and Problems* (Boston, 1912), H. Rose, *Ibsen. Poet, Mystic, and Dramatist* (New York, 1913). Consult also the bibliographical appendix to Ibsen's *Speeches and New Letters* (Boston, 1910).

The German Ibsen literature, native and translated, is very extensive, among the more noteworthy and recent contributions to it are *Samtliche Werke*, by Brandes, Schlenther, Elias, and Koht, with letters (10 vols., Berlin, 1898–1904), Brahm, *H. Ibsen* (ib., 1887), Andreas-Salomé, *Ibsens Frauengestalten* (ib., 1892), Woerner, *Ibsens Jugenddramen* (Munich, 1895), and *H. Ibsen* (2 vols., Munich, 1900–10, 2d ed., 1911), Jager, *H. Ibsen* (Swedish, Christiania, 1892, German, Dresden, 1897), Von Hausten, *Ibsen als Idealist* (Leipzig, 1897), Garde, *Der Grundgedanke in Ibsens Dichtung*, translated by Kuchler (Leipzig, 1898), Brandes, *H. Ibsen* (Copenhagen, 1898), Reich, *Ibsens Dramen*, (6th ed., Dresden, 1908), Litzmann, *Ibsens Dramen* (Hamburg, 1901).

IBSEN, SIGURD (1859–). A Norwegian statesman and journalist, born at Christiania, a son of the dramatist Henrik Ibsen. From 1864 to 1884 he lived abroad with his parents, was educated at Rome and Munich, entered the diplomatic service in 1885, acted as attaché at

Stockholm, Washington, and Vienna, but retired in 1889. He was on the staff of the *Nyt Tidsskrift* in 1892–95 and in 1898–99 edited the *Kunsten*. In the latter year he received a post in the Ministry of the Interior, in 1902 became a member of the State Council in Session at Stockholm, and in October, 1903, was appointed Minister of State at Stockholm in the Hagerup cabinet, going out of office in March, 1905. He was in favor of a friendly adjustment of the differences between Sweden and Norway. He married a daughter of Bjornstjerne Bjornson (qv). In 1906 he was appointed a member of The Hague Tribunal and in 1912 was reappointed. He wrote *Menneskelig Kvintessens*, essays (1911, Eng. trans., New York, 1912), and a drama, *Robert Frank* (1914, Ger and Eng. trans., 1914).

IBYCUS, ἰβύκιος (Lat., from Gk. ἰβυκος, *Ibykos*). A Greek lyric poet of the sixth century B.C., born at Rhegium in Italy. He lived the life of a wandering minstrel and passed some time at the court of Polycrates, the tyrant of Samos. The story of his death near Corinth, at the hands of robbers, and of the detection of his murderers by means of a flock of cranes (see Plutarch, *De Garrulitate*, xiv), which has been so beautifully told by Schiller in *Die Kranche des Ibykus*, is based on a similarity between the name of the poet and the Greek word ἰβυξ (a crane). The poet, when dying, called on a flock of cranes to avenge his death, later, one of the robbers, when they were all in the theatre at Corinth, seeing cranes hovering overhead, betrayed himself and his comrades by crying, "Behold the avengers of Ibycus." Of his erotic poems, which celebrated the charms of beautiful lads and lasses, the extant fragments are published by Schneidewin, *Ibyci Rhegini Carminum Reliquæ* (Göttingen, 1833), and in Bergk, *Poetæ Lyrici Græci*, iii (Leipzig, 1882). Consult also Smyth, *Greek Metric Poets* (London, 1900).

ICA, ē'ka. A maritime department of Peru, bounded by the departments of Lima and Huancavelica on the north, Ayacucho on the east, Arequipa on the southeast, and the Pacific on the southwest (Map: Colombia, B 6). Its area is 8620 square miles. The surface is of varied formation. The eastern part is mountainous, the western is lower and traversed by ridges of low hills. The climate is hot and dry, and the soil, with the exception of the valleys, is thin. The vine and sugar cane are cultivated extensively, corn, cotton, and indigo are also raised. The mineral wealth consists of gold, copper, and iron. Wine and alcohol are produced, and sugar refining is carried on. The population was officially estimated, in 1896, at 90,962. Capital, Ica.

ICA. The capital of the Peruvian department of the same name, situated on the river Ica, 46 miles by rail from Pisco on the coast (Map: Colombia, B 6). It manufactures wine and brandy. It was founded in 1563 and has suffered greatly from earthquakes. Pop., estimated at 10,000.

IQÁ, ē-sa', or **PUTUMAYO**, pū'tū-ma'yō. An important tributary of the Amazon. It rises in the Colombian Andes and flows southeasterly in a very tortuous course, joining the Amazon near San Antonio (Map: Colombia, C 4). Its total length is about 1000 miles, and it is navigable during the rainy season for nearly 900 miles. The region through which it flows

is very sparsely inhabited and covered mostly with thick forests. The Içá was partly explored in 1878-79. The territory along the middle course of the Putumayo is in dispute between Peru and Colombia. Here occurred the abuses against the Indians employed in rubber gathering, which were brought to light in 1911-12.

ICARIA, i-ká'ri-á (Lat., from Gk. *Ἰκάρια*, *Ikaria*). A deme of Attica, where excavations were carried on by the American School at Athens in 1888, when many interesting remains were found. Icaria is noted as the birthplace of Thespis, and as the spot to which legend assigns the introduction of wine making and of the cult of Dionysus by the god himself.

ICARIA. An island of the Aegean. See **NICARIA**.

ICARIANS, i-ká'ri-anz. Members of a communistic society, founded by Cabet (qv) to realize the ideals set forth in his romance *Voyage en Icarie*. During the years preceding the revolution of 1848 communistic doctrines had a wide following in France, and when, in 1847, Cabet announced the acquisition of land in Texas, a large number of persons agreed to emigrate with him to found a settlement there. In 1848, 69 persons set out for the colony, but were unable to endure the climate and returned after a few months to New Orleans, where they were joined by Cabet with 400 more. Early the following year Cabet, with about 300 followers, emigrated to Nauvoo, Ill., then recently deserted by the Mormons, where the colony was moderately prosperous for a few years, undertaking agriculture as well as trades and manufactures. Dissensions arose, and in 1856 Cabet was expelled together with those members of the community who supported him. In 1860 financial difficulties rendered it necessary for the remaining Icarians to abandon Nauvoo, and 35 of them founded a new settlement in western Iowa. For 20 years they grew in wealth and numbers, but in 1880 the community split into two factions, the Young and the Old Party. The former soon broke up, the latter existed until 1895, when it, too, was dissolved. In 1881 a few members of the Iowa community went to California, where they established Icaria Speranza—a society, however, more like a business corporation than a communistic settlement.

The organization of the Icarian communities was democratic. Directors were elected, but they could only execute the orders of the whole body. The members lived in little houses around a central hall where they took their meals in common. The Icarian settlements were the most successful of the communistic experiments of the early nineteenth century. Consult Shaw, *Icaria* (New York, 1884), and Lux, *Etienne Cabet und der ikarische Kommunismus* (Stuttgart, 1894).

ICARIUS (Lat., from Gk. *Ἰκάριος*, *Ikarios*). 1. In Greek mythology, an Athenian to whom Dionysus taught the cultivation of the vine. After him the deme Icaria (qv) was named. 2. The father of Penelope, wife of Odysseus.

ICARUS. See **DÆDALUS**.

ICAZBALCETA, é'kas-bal-sá'ta, JOAQUÍN GARCÍA (1825-94). A Mexican author. He was born in the city of Mexico. His first literary work was the contribution of biographical sketches to the *Diccionario universal de historia y geografía*, and he afterward edited and published a *Colección de documentos para la his-*

toria de México (1858-66), *Historia eclesiástica indiana, obra escrita a fines del siglo XVI por Francisco Gerónimo Mendieta de la orden de San Francisco* (1870), and *Nueva colección de documentos para la historia de México* (1886-92). He also prepared the *Bibliografía Méxicana del siglo XVI*, a monumental work, and wrote *Don Fray Juan de Zumarraga* (1881), a biography of the first Bishop and Archbishop of Mexico.

ICE (AS, OHG *is*, Ger *Eis*). Water in the solid state, usually crystallized in the hexagonal system. Ordinarily the crystalline structure of a block of ice is not apparent, owing to the close contact and perfectly regular arrangement of the crystals. But when a piece of ice is exposed to radiation from any luminous source, as the sun, a glowing fire, a gas or oil flame, disintegration gradually takes place, and by the use of a lens numerous small crystals may be seen studding the interior of the block, as the heat continues, these crystals expand and finally assume the shape of six-rayed stars of exquisite beauty (See **SNOW**). The freezing point of pure water is marked 0° on the Centigrade and Réaumur scales, and 32° on the Fahrenheit scale. The influence of changes of pressure on the freezing point is so slight that for all ordinary atmospheric pressures the freezing point of pure water may be considered a constant quantity. Great pressures, however, have the effect of lowering the freezing point very considerably. Thus, according to Tamman, under a pressure of 615 kilograms per square centimeter water freezes at -5° C (+23° F), and under a pressure of 1238 kilograms per square centimeter it freezes at -10° C (+14° F), and still greater pressure lowers the freezing point still further (See **MELTING POINT**). This phenomenon is connected with the fact that ordinary ice is lighter than water. In nearly all other cases the solid form of a substance is heavier than the liquid form of the same substance, and in all such cases pressure *raises* the freezing point. Even in the case of water it is only ordinary ice, or, as it is denoted, Ice I, that is lighter than water. In recent years Tamman and Bridgman have obtained several new modifications of solid water, called Ice II, Ice III, etc., whose specific gravity is greater than that of liquid water and whose melting point therefore *raises* with increase of pressure. These new modifications of ice can exist only at low temperatures and under high pressures. See **PHASE RULE**.

By cooling pure and clear water cautiously, it may be "undercooled," i.e., it may, under ordinary pressure, be obtained in the liquid state at temperatures several degrees below its normal freezing point. But this is quite different from the effect of high pressures, the state of "undercooled" water is just as unstable as the state of a "supersaturated" solution, and a slight disturbance may cause the whole mass to freeze very rapidly, just as it may cause rapid crystallization to take place in a supersaturated solution. The lowering of the freezing point by pressure has furnished one of the theories explaining the motion of glaciers. This "regelation theory" is illustrated by the following phenomenon. If a wire holding heavy weights at its ends is thrown over a block of ordinary ice, it gradually cuts its way through the block, and yet the latter remains entire. Along the line where the wire presses upon the block the melting point is lowered, and hence the ice melts

and allows the wire to descend through a minute distance, the water immediately above the wire then freezes, because it is freed from pressure, and next the ice immediately below the wire melts, allowing the wire to descend a little farther. Thus melting and almost immediate regelation proceed until the wire has cut through the block.

The freezing point of water, as that of any other liquid, is considerably lowered by dissolving in it substances of any kind, and sea water, on account of its salt, is found to freeze at -2.5° to -3.0° C (27.5° to 26.6° F). The solid separating out, under ordinary circumstances, from freezing sea water is not a mixture of ice and salt, but pure ice, and this fact has been utilized in two ways: (1) for concentrating brine in the manufacture of salt, (2) for obtaining sweet drinking water from the salt water of the sea.

Ice, having a lower specific gravity than water, floats on its surface. The specific gravity of ordinary ice at 0° C is 0.918. The specific heat of ice, i.e., the amount of heat required to raise its temperature 1° C, is much less than that of water in the liquid state, within 30° C below the freezing point it is very near one-half, and at lower temperatures it is even somewhat less than one-half, that of water. In the process of melting, ice absorbs more heat than any other solid (see FREEZING MIXTURES), more than 80 calories being required to melt 1 gram of ice, the same amount of heat would raise the temperature of the gram of melted water to 80° C (176° F).

Arctic Ice. The entire Arctic Ocean is practically covered by permanent heavy ice, or ice pack, throughout the year, though the heat of summer reduces the thickness of the main body of the pack and so facilitates the formation of leads, or open water spaces. While the average thickness of the ice cannot exceed 6 or 7 feet, yet through pressure and underrunning it attains or exceeds 30 feet in places. The average maximum thickness of sea ice in Arctic America, as determined from observations of 18 years, at 15 different and widely separated land stations, was but 76 inches. Moss and Greely have shown conclusively that the very heavy, thick floes of the pack, originally thought to be of oceanic origin, are detached parts of glaciers. Separate heavy floes, colliding under great force, break up their edge into small fragments called *rubble*, which often form enormous and extended heaps along the floe edge and are known as *pressure ridges*. The sea ice forming against the land, and adhering thereto despite the rise and fall of the main sea floe with the tides, is called an *ice foot*.

As there are 1,000,000 square miles of unknown areas within the confines of the Arctic Ocean, it is impossible to fully describe the movements of the whole of the oceanic pack. It is known, however, that the pack to the north of Bering Strait, through the action of the currents and prevailing winds, drifts west-northwesterly to the neighborhood of the pole north of the Franz Josef Archipelago, whence the drift turns southwesterly towards Jan Mayen. Except the discharge of a large and yet very inconsiderable amount of Arctic ice into the Atlantic Ocean, through the Greenland Sea, no ice of any amount emerges from the Arctic Ocean. The pack of Baffin Bay is in large degree stationary, though it divides in

summer into three distinct masses, known as the North, the Middle, and the South Ice, the last-named, extending into Davis Strait, becomes navigable in late summer. The ice of Kara Sea similarly divides, but irregularly and with less possibility of navigation. The pack of Barents Sea, affected by a northeasterly current, tends to coalesce with the main pack of the Arctic Ocean. The southerly limit of the Arctic sea ice trends south-southwesterly from about 65° of north latitude, east of Iceland to the forty-fifth parallel on the Banks of Newfoundland. Along the Arctic coasts of America, Asia, and Europe, there are formed in summer wide shore belts of ice-free sea, varying largely in size according to the season, they are largely due to the influence of the fresh-water discharge from continental rivers.

Antarctic Ice. South-polar ice conditions strikingly contrast with those of the Arctic zone. The very extended Arctic Ocean is permanently covered with ice, of which 99 per cent remains in the vicinity of its formation. In the south the vast continent of Antarctica, with its periphery of 10,000 miles or more, is fringed with a belt of annual formation of sea ice several hundred miles wide in its northerly extensions. Usually the Antarctic pack drifts northerly, leaving a wide belt of nearly ice-free sea along the continental shelf. The pack does not attain the thickness of that of the Arctic Ocean. It drifts largely into the Temperate zone and disintegrates freely to the north of the Antarctic circle. While its northern limits vary with the seasons and are not definitely determined save for small areas, it has been known to reach the forty-eighth degree of south latitude before entirely melting.

Icebergs. This name is given to sections of glaciers which have become detached from the main body of glacial ice after its front, or snout, has reached a sea or lake. Fresh-water bergs are of rare occurrence and of inferior size. Main interest attaches to oceanic icebergs, which have their birth as offshoots of the glacial caps of lands of considerable area. Such Arctic lands are Greenland, Northeast Land, portions of Grinnell Land, of Spitzbergen, and of Jan Mayen, which are productive of bergs in the order named. To these Greely, supported by Harris, adds a hypothetical land to the northwest of Parry Archipelago. Of the regions named, Greenland is preeminent for the number and the size of the bergs which drift into Atlantic waters. While the most extensive and remarkable of the *live* glaciers—those terminating in the sea—are those debouching into the Greenland Sea from the east Greenland coast, yet the conditions of currents and of winds are such that very few of these icebergs reach the open Atlantic Ocean. The greater number of the bergs of the Atlantic come from Disco Bay, with its wonderful and contributing fiords of Jacobshavn, Torsutakak, and Great Karajak, then follow in importance Umnak Fiord, 71° N, and Angpadlartok (near Upernivik), 73° N. The glaciers of Melville Bay, Kane Sea, Smith Sound, and east Greenland (by drift around Cape Farewell and thence north) together add somewhat to the long procession of icebergs which, collected by currents in about 73° N, skirt the western shores of Baffin Bay in their southward march into the Atlantic waters adjacent to Newfoundland.

The Greenland bergs are occasionally of great

size Large icebergs tower from 100 to 250 feet above the ocean, which makes their entire height from 700 feet to about 1600, as about one-seventh is above water. Dr. Hayes reports one as rising over 300 feet above the sea, but it was not carefully measured. In Kennedy Channel Greely followed a floeberg (a low tabular iceberg) which was 15 miles long, over 100 feet thick, and of unknown breadth. In the Atlantic Ocean the southern limit of icebergs extends from lat 60°, southeast of Iceland, in a south-southwesterly direction to about 45° N, off the Banks of Newfoundland. In 1842 an Atlantic berg, it is said, was recorded in 38° 40' N. lat.

It is in the south-polar regions, however, that are found icebergs in the greatest numbers and of maximum size. Their annual accretions must run into hundreds of thousands, for glacial-capped Antarctica, with its more than 10,000 miles of icy coasts, does not, so far as is known, present 100 consecutive miles of shore free from discharging glaciers. Besides the thousands of miles of live glaciers on land, another very prolific source of bergs is Ross Barrier. This is an oceanic ice cap, extending through more than 28° of longitude, nearly 600 miles, with a sea face of solid ice rising from 80 to 250 feet above the ocean. The Antarctic icebergs are almost always tabular, flat-topped, with perpendicular sides, which often rise 200 feet or more above the water. Their size is more astounding than their height. Dr. Bruce observed one more than 30 miles in length and of unknown breadth. Two different ships reported another berg, which was more than 40 miles in length, and which must have had more than 1000 miles of surface area. Most of these bergs drift north and melt between lat 40° and 50° S. They are frequently seen in the neighborhood of Cape of Good Hope, and one was reported in lat 26° 30' N, long 30° 36' W, within a few hundred miles of Rio de Janeiro.

Bibliography. H. Rink, *Danish Greenland* (London, 1877); John Tyndall, *Forms of Water in Clouds and Rivers, Ice and Glaciers* (New York, 1880); A. W. Greely, *Three Years of Arctic Cruise*, vol. II (ib., 1886); H. C. Russell, *Icebergs in the Southern Ocean* (Sydney, 1897); William Coles-Finch, *Water Its Origin and Use* (New York, 1909). See WATER, MELTING POINT, FREEZING POINT, PHASE RULE, GLACIER, REFRIGERATION.

ICE, LAW OF. After ice has been harvested it is personality and is subject to the rules of law governing that form of property. Before it is harvested it is deemed realty for most purposes, although a contract for the sale of all the ice on a certain pond is treated as a contract for the sale of a chattel and not of an interest in real estate.

If the land beneath a particular body of water, whether stream or lake, is subject to private ownership, the ice that forms on the water belongs to the owner of such land, and he has exclusive authority to gather and dispose of it. Hence a lease of the land or a conveyance of the fee carries to the tenant or to the grantee the ownership of the ice which forms during the term of the lease, or which exists at the date of the conveyance. It is in the nature of an accession to the land, being an increment arising from a formation over it, and is a part of the real estate under the rule that the ownership thereof extends indefinitely upward from

the soil. The landowner may grant to another the right to take ice from private waters, as a profit à prendre, i.e., as a right to take the products or proceeds of land.

A riparian owner's right to ice on navigable rivers depends upon his ownership of the land under them. In States where the fee of such rivers is vested in the public the adjoining landowner has no title to the ice, and it belongs to the first appropriator. In other States, where riparian owners are accorded title to the land under navigable waters, they can maintain trespass against any one taking the ice without their consent. At times ice-covered streams or lakes are used as highways of travel and the question has arisen whether the harvesting of ice upon such a thoroughfare amounts to a nuisance, as an unlawful obstruction to travel. The courts have given this answer. In the absence of legislation on the subject, the right of travel and the right of harvesting ice on navigable waters are public and are to be exercised reasonably. What is a reasonable use of either right depends upon the relative benefits to the community from its exercise. If the privilege of harvesting ice is deemed of greater importance than that of traveling upon it, the latter cannot be set up to prevent or abridge the exercise of the former.

The right to harvest ice forming upon public waters is not private, but public or common. Any person may enter such ice fields and take what he pleases, so long as he does not unlawfully interfere with the like right of others. What acts amount to an appropriation of ice on public waters is a question upon which the courts are not agreed. One view is that an appropriation is made by marking and staking off a plot of ice and preparing the surface for cutting. The other view is that a person does not gain any property rights in such a plot of ice until he has actually reduced it to possession. The subject is regulated in some States by statute. Consult Gould, *The Law of Waters, Including Riparian Rights* (Chicago, 1900); Coulson and Forbes, *The Law Relating to Waters* (London, 1902), and the statutes of the various States.

ICE AGE. See GLACIAL PERIOD; PLEISTOCENE PERIOD.

ICE BEAR. The polar bear. See BEAR.

ICE-BERG. See ICE.

ICE-BREAKING STEAMER. A vessel used for keeping open a navigable passage through ice. Such vessels are much used on the Great Lakes of the United States, where they are usually adapted for carrying cargoes or railway cars. They are very heavily built to stand the shock of ramming the ice or of running up on it at the bow and breaking it by reason of their weight. (See FERRY.) During many years the problem of constructing such vessels was studied by Admiral Makaroff, of the Russian navy, and several vessels were built from his designs. The largest of these was built in England in 1898-99, and is called the *Yermak*. She is of 8000 tons' displacement and has four screws, one under the overhanging bow to suck down the ice, so that the bow will ride over it and, descending, crush it. This screw also creates a current which drives the broken ice astern. The stern is recessed to receive the bow of a vessel following her through the channel which she makes. Her length is 305 feet, beam, 71 feet; and draft, 25

feet The coal capacity is very great—3000 tons—as it was intended to use her in Arctic exploration, she spent some months in the Arctic Ocean during the summer of 1900 and was very successful in breaking her way through ice fields in harbors, but in 1901, against the heavy ice of the polar pack, she proved inefficient During the past year (1914-15) heavy gyroscopes have been mounted on ice-breaking steamers for the purpose of making them roll and thereby add to their efficiency The preliminary experiments have been successful, and it is likely that ice breakers will hereafter be fitted with devices of this kind See FERRY

ICE CAVE Any natural formation of ice in a cave or crevice The walls of caves often become cooled to such a point by the infiltration of cold air in winter or during the frosty nights of spring and autumn that the percolating waters rapidly freeze The ice usually disappears for a few weeks in September The most celebrated ice cave in the world is that of Dobschau (Dobsina) in Hungary, situated in the Carpathians, at an elevation of about 2700 feet Consult Balch, *Glaciers or Freezing Caverns* (Philadelphia, 1900)

ICE COLUMNS See FROST

ICE GULL. A name given to several gulls encountered by sailors in icy regions, most properly perhaps to Ross's gull See GULL

ICE INDUSTRY, THE The ice industry is divided into two branches, in accordance with the origin of the ice itself *Natural ice* is cut in winter from rivers, lakes, and ponds, stored in ice houses, and distributed to consumers as needed *Manufactured ice*—or, as it is more commonly called, *artificial ice*—is produced when and where required and is generally distributed with comparatively little intervening storage The collection and preservation of ice and snow, on a scale which was small indeed as compared with the operations of the present day, appear to have been practiced from early times by most civilized nations having the natural products within their reach Where neither snow nor ice was provided by nature, various means of artificial production have been practiced in a small way for centuries, such as the exposure of water in porous receptacles, and packing common or some other kind of salt about vessels containing water But the modern ice industry began in the United States early in the nineteenth century, with the transportation of ice in sailing ships from cold northern to warm southern ports, and the production and sale of manufactured ice has attained large proportions and made an ample and cheap ice supply quite independent of local temperatures

Natural Ice It is said that both the Greeks and the Romans packed snow in deep underground pits, and that Nero established ice houses in Rome At the end of the seventeenth century dealers in ice and snow were quite common in France In 1799 a cargo of ice, cut from a pond near Canal Street in New York City, was shipped to Charleston, S C This may be considered as of little moment, but in the winter of 1805-06 Frederick Tudor, of Boston, Mass, entered the ice field in good earnest and after some heavy losses succeeded in establishing an export trade in ice which was the beginning of the modern industry Tudor's first ice cargo, of 130 tons, was shipped from Boston to Martinique in the winter of 1805-06, but though the ice reached its destination in safety,

the venture resulted in a loss Two years later a shipment of 240 tons to Havana, Cuba, also resulted in a loss to Tudor A monopoly of the ice trade with the British West Indies was secured by Tudor about 1816, and a like privilege from Spain in 1815-16 From 1815 to 1820 the same merchant extended his ice trade to Charleston, S C, Savannah, Ga., and New Orleans, La Others followed his example, until in 1855 ice exports from the United States, according to statistics of the Treasury Department, amounted to 41,117 tons, valued at \$190,793 These exports increased to 68,802 tons, valued at \$267,702, in 1870, after which time they decreased until in 1900 the tonnage was 13,720 and its value \$29,501, while in 1913, 7979 tons, valued at \$31,751, were exported The foreign ice trade was soon outstripped by the domestic commerce in what had long since changed from a luxury to a necessity Published figures for the harvest of Maine and Hudson River ice showed that those two sources alone produced yearly quantities ranging from 2,226,000 tons in 1880 to 5,626,430 tons in 1899 The capacity of Hudson River district ice houses in 1902 reached a maximum, being placed at 4,833,100 tons, of which 4,606,800 tons actually were housed, but this capacity declined steadily and in 1914 was 3,226,086 tons, while 1,938,149 tons actually were harvested This total capacity in recent years has been rarely utilized, the deficiency in the amount of ice housed sometimes reaching as much as 65 6 per cent (1913) The house capacity of the natural-ice business in the United States in 1914 was estimated at 30,000,000 tons, valued at \$75,000,000, and the real estate valued at \$60,000,000 It should be remembered, further, that in the aggregate the additional harvest for private purposes is immense

Harvesting Ice is a comparatively simple operation, or series of operations, the main features of which are as follows The snow, if any, lying on the ice is removed by scrapers, as is also any contamination of the top surface In case there is an upper layer of snow ice, it is loosened by field planes and then removed Markers are next used to outline the blocks, which are followed by plows, which cut the grooves still deeper The scrapers, planes, markers, and plows are drawn by horses or mules The parallel grooves, it should be understood, are first cut in one direction, then another series is cut at right angles to the first The final grooves extend nearly through the ice, so that the cakes may readily be pried apart by means of suitable tools When the latter operation has been effected, the cakes are floated to the shore through channels provided for the purpose, and there elevators, generally inclined, lift the ice to the ice houses Dirty and broken cakes are rejected, and in some houses the cakes are planed to nearly uniform thickness on the elevators The cakes are packed close together, with sawdust or other insulating material above the final layer, and between the ice and the outer walls of the ice house, the idea being to eliminate melting as much as possible The ice houses are generally tall structures, with outer walls composed of one to three compartments filled with insulating materials Once the most approved plan was to have an outer compartment in which the air was allowed to circulate An inner or dead-air compartment is usually found, but some authorities recommend that this

also should be packed with sawdust or shavings as well as a central space packed tightly with the same material. Now the elimination of air is considered desirable, and the ice should be piled very high. The bottom of the ice house

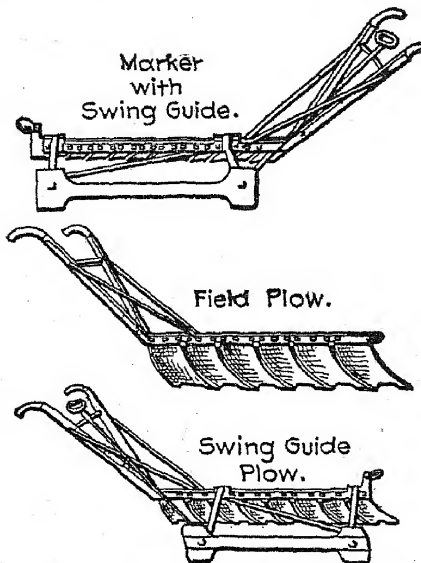


FIG. 1. ICE TOOLS

should have tight and well-constructed foundations going down below frost and must be well drained, while the roof should be not only watertight but as well insulated as the walls, and movable covers for the ice are also recommended. Recent experiments have shown that an efficient and economical ice house that is also fireproof may be made of glazed terra-cotta tile in two walls 10 inches apart with mineral wool or cork between. Railway sidings or docks, or both, afford means for shipping the ice to dis-

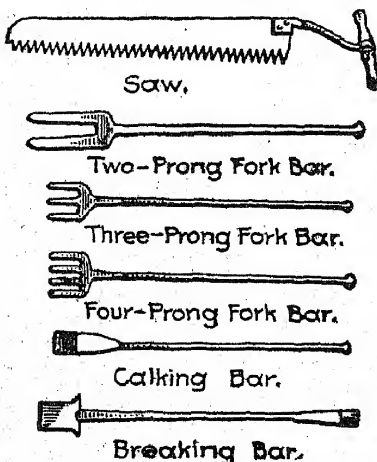


FIG. 2. ICE TOOLS.

tributing centres. Specially constructed cars, with lined sides and bottoms, are used where ice is to be shipped long distances, and in the South the cakes are carefully packed in addition.

Besides the ice tools already named (snow scraper, ice plane, marker, and plow) the follow-

ing may be mentioned: augers and tapping axes, for inspecting the ice and for draining it of surface water; saws; forked and pronged and chisel and needle bars, for separating the cakes after the markers and plows have done their work; trimmer bars, for squaring the cakes; hooks, grapples, and forks, for pushing them to the elevator; chain scoop nets and sieve shovels, for removing slush ice from the channels; hoisting, drag, and edging tongs, adzes and long-handled chisels, for packing the ice in the

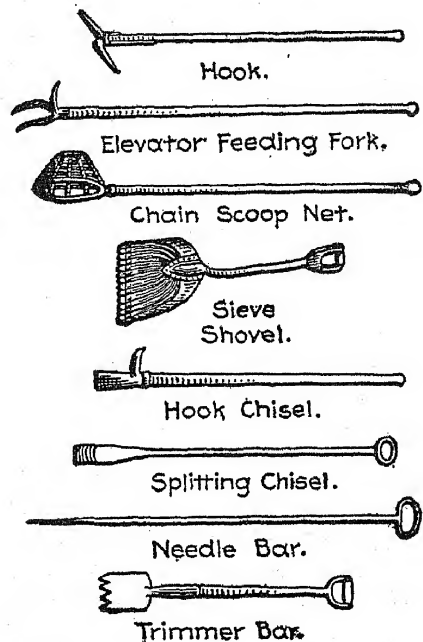


FIG. 3. ICE TOOLS.

houses; saws and bars, for loosening the ice preparatory to shipment from the houses; and, finally, delivery wagons, tongs, saws, axes, shaves, and scales.

Artificial Ice. A sketch of the development of ice-making apparatus and descriptions of the principles and practices involved will be found under REFRIGERATION. The following figures regarding the growth of the industry in this country are taken from the section on the Manufactured Ice Industry in the Thirteenth Census of the United States (Manufactures, 1913). The first ice factory of importance in this country was erected at New Orleans in 1866. In 1870 three other factories located in Southern States were included in the census returns. The number of establishments reported increased to 35 in 1879, 222 in 1889, 775 in 1899, and 2004 in 1909. The total capital invested in these 2004 plants was \$118,641,538, and the value of the products, which aggregated 12,647,949 tons, was \$42,953,055 against \$13,874,513 in 1899. An unofficial estimate for 1914 places the number of ice factories at 3500, their yearly output at 18,000,000 tons, valued at \$45,000,000, their daily capacity 135,000 tons, and the total investment some \$150,000,000.

These figures, like those previously given for natural ice, do not include the hundreds of plants making ice exclusively for their own use, such as breweries and cold-storage houses. Of

the 2004 plants reported in 1909, 1616 used the compressor and 357 the absorption system (see REFRIGERATION), while 31 used both systems. In 1899 the total product of the 775 factories was 4,294,439 tons, of which 4,139,764 tons, or 96.4 per cent, were can ice and only 154,675 tons plate ice. In 1909 the product of the 2004 establishments was 12,647,949 tons, of which 11,671,547 tons (92.3 per cent) were can ice and 976,402 tons (7.7 per cent) were plate ice. The Middle States produced more ice than any other group, the amount being 1,574,980 tons, as compared with 1,414,158 tons for the Southern States, and only 40,059 tons for the New England States. The average value of the ice at the plants for the whole country in 1899 was \$3.11 per ton for can ice and \$2.85 for plate ice. In 1909 the average value was \$3.15, ranging from \$2.33 in Missouri to \$4.70 in Texas, \$5.26 in Oregon, and \$6.08 in Idaho. As a rule, the Southern States now depend wholly upon the manufactured product for their ice supply. Texas in 1909 ranked second among the States in the value of the product. As one goes farther north, natural ice comes more and more into competition with the manufactured article, until at the extreme north it actually or practically displaces the latter, no establishments for its manufacture, e.g., being reported to the Thirteenth Census for Maine, New Hampshire, Minnesota, North Dakota, South Dakota, Montana, or Wyoming. But the use of manufactured ice has increased rapidly of late and is continually extending towards the north.

Sanitary Aspects. The sanitary quality of ice supplies depends chiefly upon the presence or absence of disease germs, chiefly those of typhoid fever, in the original water, and upon the effect of freezing upon such germs. In addition there is the possibility that manufactured ice may become contaminated during the freezing process by sick or careless workmen, and that any ice may be fouled while it is being distributed to consumers. Proper washing of ice before delivery and domestic use, care not to bring ice in contact with food or water, and proper supervision of ice factories, would go far towards preventing danger from what may be termed incidental contamination. The water from which artificial ice is made is frequently distilled or filtered, or both. In general, it may be said that artificial ice should be made from none but naturally pure water or from that which has been purified, and that natural ice should not be harvested from polluted streams or lakes. It may be noted, however, that natural ice, when formed in fairly deep and quiet water, eliminates much of the impurities while freezing, and that recent bacterial studies show that after a few weeks practically all bacteria, and particularly the dangerous ones, disappear. In other words, the effect of storage is advantageous in tending to cause germs to perish. Under anything like carefully guarded conditions, therefore, the chance of typhoid infection by means of ice is small. In the case of artificial ice the freezing process, being from the outside in, concentrates the impurities at and near the centre of the cake.

Bibliography. Hile, *The Ice Crop* (New York, 1892), Louis Schmidt, *Principles and Practice of Artificial Ice-Making and Refrigeration* (3d ed., Philadelphia, 1908), *Ice and Refrigeration Blue Book* (2d ed., Chicago, 1909), and for the sanitary aspects of the subject, con-

sult *Reports of the Massachusetts State Board of Health* for 1889, 1892, and 1900, *Report of the Boston Board of Health* for 1901, Prudden, *Drinking Water and Ice Supplies* (New York, 1900), Sedgwick, *Principles of Sanitary Science and Public Health* (ib., 1908). The files of the *Refrigerating World* (New York, monthly) and *Ice and Refrigeration* (Chicago and New York, monthly) may be consulted for current news and trade developments.

ICE/LAND An island in the north Atlantic, under the sovereignty of Denmark. Its main area is barely outside the Polar zone, as the Arctic circle intersects the most northerly points of the island. It extends from long 13° 23' to 24° 35' W., while its most southerly limits are in lat 63° 35' N (Map Denmark, F 1). The nearest land is Greenland, about 150 miles to the northwest, while Scotland is 500 miles to the southeast.

Area and Physiography. The area of Iceland has been variously estimated from a minimum of 39,756 to a maximum of 40,497 square miles, of which less than one-half is available for farming and pasturage. The south shores are sandy lowlands, unbroken by bays or harbours, while the rest of the coasts presents a succession of high precipitous cliffs, indented by numerous fiords. On the southwest shore are the harbours easiest accessible to shipping. It has been appropriately termed the contrasting land of fire and ice, of volcanoes, glaciers, and geysers. The surface in general consists of series of rough plateaus, formed of lava and other eruptive matter. About one-eighth of the land is glacier-hidden. Here and there are large mountain domes, mostly ice-clad—the highest, Öræfajökull, 6424 feet. Fossiliferous strata, especially in the northwest peninsula, of the Tertiary period show that extensive forest areas then existed. Glacial moraines and lava streams have formed numerous depressions, wherein have gathered many lakes. Elsewhere are true crater lakes, the latter class being numerous in the region to the west of the great snow fields of Vanajökull on the southeast coast.

Climate. The subarctic and oceanic situation makes the climate harsh rather than extreme. Southerly-drifting ice besets the northern coasts, making the summer cold, but the northerly ocean currents along the south shore ameliorate the temperature. While the average winter temperatures of the entire coast line vary slightly from 32° F., the summer averages of the north and east shores range from 43° to 44° against 48° to 50° on the south and west coasts.

Fauna and Flora. Few, if any, of the land animals are indigenous. Reindeer were introduced in 1770. Foxes came from ice floes, and rodents from ships. Reptiles and batrachians are absent. Half of the hundred species of birds are aquatic, and among them the eider duck is valued and protected for its down. Walrus and whales are now rare, and seals are steadily decreasing in number. The vegetation is of the Arctic-European type. While there were extensive forests in the Tertiary period, the trees to-day are dwarf beeches, willows, elms, and mountain ash, specimens 30 feet high being rare.

Volcanoes. The island is especially of volcanic origin, as from such activities have been built up the jagged, lava-covered, ice-strewn uplands, averaging 2000 feet or more in elevation, which form nine-tenths of the area of the surface. Magnificent as to scenery, these plateaus

are largely regions of desolation. Practically the only vegetation of the lava slopes is scattered coverings of Iceland moss, which there finds favoring foothold. Indeed the whole land has suffered from volcanic eruptions, of which 25 have occurred within historic times. In all there are more than 100 separate volcanoes, of which the most widely known is Hecla, 5100 feet high, in the extreme southern part. There are thousands of craters, that of Askja with an area of 34 square miles being the largest. Hecla had 18 eruptions in historic times up to 1845, and Katla 13 up to 1860. The eruption of Askja, southwest of Vatna, in 1875 was so violent and long-continued that its ashes reached as far east as Sweden. The most violent and destructive eruption was that of Laki in 1783, which was doubly dangerous from the torrential floods caused through the melting of large glacial masses by the molten lava. An area of not less than 218 square miles was permanently covered by the flowing lava. Enormous regions of pasture and of arable land were devastated, and 80 per cent of the stock—cattle, sheep, and ponies—were killed. Famine conditions, and epidemics arising from volcanic gases, caused more than 9000 persons, about one-fifth of the population, to perish before normal conditions were restored. Including the snow-hidden portions, the present lava fields cover one-fourth of the surface of the island. The largest snow-free lava field, to the north of Vatna, is over 1700 square miles in extent. Largely formed from eruptions of Askja, it has accretions from 19 other volcanoes. Earthquakes of violence have repeatedly occurred and at times have caused enormous damage. Those of 1784 and of 1896 each destroyed many buildings and injured others by the hundreds.

Glaciers. In the Glacial age the island was completely covered with ice. At present there are more than 120 separate glaciers of considerable size, their aggregate areas approximating 5200 square miles. There are very few, if any, living glaciers, though Vatna closely approaches the sea. The location and surface areas in square miles of the largest glaciers are as follows: Vatna, in the southeast, 3280; Hofa, near the centre, 520; Lang, in the west, 500, and Myrdals, in the north centre, 390.

Geysers. Hot springs are numerous throughout several parts of the island, and in the so-called geyser region, about 30 miles northwest of Hecla, there are more than 100 in a small area. The most widely known of them is the Great Geyser, 60 feet in diameter and having an intermittent period of discharge varying at different times from 6 to 30 hours. It throws at times, to the height of 150 feet or more, immense columns of water of temperatures varying from 170° to 190°. One geyser at its bottom depths was found to have water of the temperature of 262° F—possibly the hottest spring in the world.

Agriculture and Other Industries. More than one-half of the inhabitants live by horse, cattle, and sheep raising. A large part of the slopes and river valleys of the plateaus affords excellent pasture for sheep, and in the low-lying lands are extensive meadows, which, properly managed, could support twice the number of cattle that now graze on them. In 1911 the island contained 43,879 horses, 25,982 head of cattle, 574,053 sheep, and 671 goats. A great deal has been done latterly to improve the soil.

Agricultural societies have been formed, and there are now four agricultural schools. At one time a little barley was grown, but it could not be made to pay, and therefore field cultivation has been abandoned. Horticulture, on the other hand, makes great progress, potatoes, cabbages, and rhubarb thrive well, and some berries, such as currants, are cultivated. Woods have never existed since the Glacial period, and the brushwood of birch is less extensive than formerly, owing to the sheep. The birch is seldom higher than a man, though in one place on the east side some specimens attain a height of over 30 feet. The mountain ash reaches the same height. The fishing grounds (cod, herring, flounders, whale, and seal) are frequented by English and French boats. The sea is very stormy, and therefore fishing is best pursued in large and strong vessels. The fishermen of Iceland have had to content themselves with small open boats. They brave the billows of the ocean in winter with the greatest boldness and contempt of danger, and every year many lose their lives. Want of capital has prevented them from acquiring large vessels, but considerable progress has been made in this direction, and the Icelanders now possess a fair fleet of fishing smacks. The fisheries furnish nearly three-fourths of all exports and give employment to about one-sixth of the population. The cod fisheries are among the most important in the world. In 1910 the export of salt cod amounted to 0,753,711 kroner (1 krone = \$0.268). Manufacturing industries, with the exception of cod liver and other fish oil, are utterly absent. The simpler articles of dress and necessaries of life are usually supplied by every native for himself, and the number of artisans is very small. The mineral deposits are not sufficiently large to repay exploitation. Turf is the chief fuel, but some coal is imported.

The chief exports are dried fish, wool, live sheep and horses, eider down, salted meat, butter, hides and skins, cod liver and other fish oil, and whalebone. The annual value of the exports amounts at present to over \$4,000,000. The imports consist of textiles, cereals and other food-stuffs, coal and wood, manufactures of metals, and boats, and have an annual value of between \$3,000,000 and \$3,750,000. In 1911 the imports were valued at \$3,813,622 and the exports at \$4,280,144. The exports to Denmark in 1912 amounted to nearly \$2,000,000 and the imports from Denmark to about \$1,300,000. Up to 1854 the trade of Iceland was a state monopoly of Denmark. Since then it has been free and is now chiefly in the hands of Denmark and Great Britain. Iceland has regular steam communication with Denmark via Leith, the port of Edinburgh. There are a number of trading stations on the island, and six commercial centres. There are few roads. In the settled districts the traveler follows bridle paths worn by the hoofs of the small Iceland horses. A few good roads have recently been built, and some of the streams are being bridged. At the end of 1910 Iceland had 87 telegraph and telephone stations, with 857 miles of line. The people are sturdy and have not allowed the hardships they have endured to crush them. As the farthest outpost of civilization, they have always had to fight a hard battle with nature. They are of an earnest, quiet, and somewhat melancholy disposition, and as a rule very intelligent. Though the lower classes live in poor circumstances, they are very enlightened, perhaps

in no other country of Europe are so many books, in proportion to the population, printed and sold as in Iceland. The island contains several printing establishments, from which issue 18 newspapers besides other periodicals. During recent decades many Icelanders have emigrated to America and have founded flourishing colonies in Manitoba. In all about 15,600 have crossed the Atlantic, but of late years the emigration has fallen off. Besides Reykjavik, the capital, with a population of 11,600 (census of 1910), the chief settlements are Akureyri (2089) and Isafjord (1859).

Government. At the head of the administration is a minister, appointed by the King of Denmark, resident at Reykjavik, and responsible to the Althing for all acts concerning Iceland. The Althing, or the Parliament of the colony, although in existence since the Norwegian occupation, had not attained its full power before 1874, when the new constitution granted by the King of Denmark endowed it with complete legislative authority. The Althing consists of 6 members, of whom 30 are elected by the people and 6 appointed by the crown. It is convened every two years and is divided into two chambers, of which the upper is composed of six elected and the six appointed members, and the lower consists of 24 elected members. The King of Denmark has the nominal right of veto. In 1911 suffrage was extended to women and servants, and the right is now possessed by all competent adults. For purposes of administration the island is divided into three districts—the South, the West, and the North and East—administered by two officials having their seats at Reykjavik and Akureyri. The districts are subdivided into 20 smaller divisions known as syssels and administered by sheriffs, who perform the functions of tax collectors and judges of first instance. At Reykjavik there is a court of second instance for the trial of cases from which appeals are made to the Supreme Court at Copenhagen. The revenue of the country is derived almost entirely from customs and tax on spirits, tobacco, coffee, and sugar. Elementary education is well provided for, and the number of illiterates is remarkably small. There are also a number of higher schools, a theological seminary, a college and a university at Reykjavik, with about 100 students. For religious purposes Iceland forms a separate bishopric in the Lutheran church.

Population. The population, estimated at over 46,000 at the beginning of the nineteenth century, was 72,445 in 1880, 78,470 in 1901, and 85,188 in 1911. The birth rate is large, but it is offset by the large infant mortality resulting from the severity of the climate. The Icelanders are of Norwegian origin and belong exclusively to the Lutheran church. They live mostly on isolated farms, there being very few settlements.

History. Iceland was not visited by Europeans, as far as is known, until the end of the eighth century, when some Celts landed on the island, but its history really dates from about 870, when various Norsemen discovered it, chiefly by accident. One of these, Flóki Vilgerðarson, gave it its present name. Soon thereafter the Norwegians came in large numbers, owing to the despotism of Harald Haarfagi (q.v.) at home, and permanent settlements were made, among them the present capital, Reykjavik. The settlements were all independent of

one another, and for some time the only bond of union was furnished by their common religion, until finally in 927 one Ulfrjotr was sent to Norway to prepare a code of laws. He did so, returning in 930. His constitution provided for a yearly assembly, but all details are lacking to us. Many legal changes, however, had to take place before even a semblance of order prevailed in Iceland. In time regular territorial divisions appeared, and a system of law very similar to that of Anglo-Saxon England. The most important event in the early history of Iceland was the conversion of its inhabitants to Christianity. The first missionary was Thorgeir Kotharson, who came in 981, but after five years left the country, having failed utterly. More successful was the attempt made under the auspices of King Olaf Tryggvason of Norway (995-1000), who introduced Christianity, chiefly by force, about the year 1000. Under the influence of the new religion civilization gradually spread, and the laws became milder. Until 1103 Iceland belonged to the province of the Archbishop of Bremen, later to that of Lund. Meanwhile the kings of Norway regarded Iceland with a jealous eye, for it was a place of refuge for all their rebellious subjects, but all attempts to conquer it failed for many years. The history of the island was mainly one of rivalries of different chiefs, and about the beginning of the twelfth century all the contests in the land were connected with those of the three sons of Sturle—the historian Snorri, Thord, and Sieghvat, the most powerful chiefs of their time. By marriage and other means, Sturle Thordson had become *godar*, or supreme magistrate, of several provinces, for these offices were hereditary in certain families. These offices he transmitted to his sons, who, however, were unable to agree. Finally, in 1262, Norway having been appealed to, King Haakon of that country induced Iceland to join its fortunes to that of Norway. The prosperity of the country from that time onward rapidly declined, as strict navigation laws were enforced. In 1280 Iceland, joined together with Norway, came under the crown of Denmark. This is called the union of the Three Crowns. Much of the subsequent history of the island is filled with the relation of physical evils which desolated the land and effectually subdued the spirit of its inhabitants. Thus, there were repeatedly severe volcanic eruptions, and between 1402 and 1404 the black death swept away, it is said, two-thirds of the population. In 1540 Christian III of Denmark began to introduce into Iceland the Reformation, which rapidly prevailed throughout the whole country. During the Napoleonic wars England captured it, but gave it back to Denmark by the Treaty of Vienna in 1815. The Althing, or Legislative Assembly, was dissolved, but was reorganized in 1843. For many years constitutional conflicts with Denmark went on, which were amicably settled in 1874 by granting home rule to Iceland. In 1903 the ministry for Iceland in the Danish government was transferred to Reykjavik. In 1911 a ministry strongly favoring home rule was chosen.

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ICELANDIC LANGUAGE With the Norwegian popular dialects and Faroese, Icelandic forms the West Norse subdivision of the Scandinavian languages, as opposed to the East Norse, made up of Swedish and Danish. The history of Icelandic begins with the settlement of Iceland by Norwegians, principally from western Norway, at the end of the ninth century. After this time there was gradually developed in Iceland a particular West Norwegian dialect, which, however, at the outset differed but slightly from the parent Norwegian. Only after the introduction of Christianity, about the year 1000, is it possible to speak of languages instead of dialects in the whole Scandinavian north, and at this time Icelandic, too, ranged itself by the side of Norwegian, Swedish, and Danish as a separate language, with characteristic differences in sounds, inflection, and vocabulary.

In the history of Icelandic it is customary to distinguish two main periods—Old Icelandic, from the settlement of the island, in the ninth century, to the Reformation, at the middle of the sixteenth century, and New Icelandic, down to the present day. Old Icelandic is further subdivided into three periods—the first of which extends from 874 until about to the middle of the twelfth century; the second, the so-called classical period, during which the principal literary works were produced, from about 1150 to about 1350, and the third, or transitional period, from 1350 to 1540. The language of the first period, at the beginning identical with that of Norway, at the end is distinguishable from it by but comparatively few differences. One of the most plainly discernible and characteristic distinctions between the two is the retention in Icelandic of initial *hl*, *hm*, *hn*, whose *h* early disappears in Norwegian, as it does in Swedish and Danish, but which has remained in Icelandic, alone of all the Germanic languages, to this very day. The language of the second period, on the

other hand, exhibits many important changes along broad lines, in phonetic conditions and in inflectional forms, that from this time on sharply differentiate Icelandic and Norwegian. This forms an intermediary period which witnesses the gradual growth of those changes in the language whose consummation marks the beginning of the new period of Icelandic. During this whole time the language remained practically homogeneous throughout the island, and no sharply defined dialectic differences were developed. Manuscripts of the thirteenth and fourteenth centuries from the west of Iceland show, it is true, characteristic phonetic conditions in certain instances, and it is likely that others existed as between the north, west, and southeast, but none of them are important. From 983 to about 1400 Icelandic was also spoken in the settlements of Greenland, but to what extent this language deviated from that of Iceland cannot be determined from the few runic inscriptions which have come down to us.

Old Icelandic, both from the standpoint of the language itself and of the literature written in it, is by far the most important of the ancient Scandinavian languages. The sources of our knowledge of it are an almost unparalleled literature in prose and verse, written after the early part of the twelfth century and even in the thirteenth century, but often of far more ancient ultimate origin. The alphabet used is the usual Latin script of the end of the Middle Ages, introduced by way of England and modified to fit the special conditions of the language. The few runic inscriptions that exist in Iceland are unimportant from a linguistic point of view, in that they are all more recent than the oldest manuscripts written in Latin letters. The oldest conditions, however, are in many cases not to be found in the oldest manuscripts, but in poems contained in manuscripts of the thirteenth century, which, as a consequence of their metrical construction, have kept forms as old in some instances as the ninth century, from which early time they had been transmitted orally from generation to generation. The oldest manuscript that has been preserved is an inventory of the church at Reykjavik in Iceland, the most ancient part of which was probably written between 1178 and 1193. The principal manuscript of the *Elder Edda*, the so-called *Codex Regius*, dates from the end of the thirteenth century, the principal manuscript of the *Snorra Edda*, the so-called *Codex Upsaliensis*, is of the same period. The best manuscripts are all written before the middle of the fourteenth century. Icelandic manuscripts are both parchment and paper. The former medium was used from the beginning of writing, at the end of the twelfth century, down into the sixteenth century, the latter from the fifteenth century almost to the present day. Old Icelandic manuscripts are preserved principally in four large collections—viz, the Arnæmagnæan collection, so called from the Icelandic Arni Magnússon, who collected and gave it to the University Library in Copenhagen, the collection in the Royal Library in Copenhagen, the so-called Delagardic collection in the University Library in Upsala, Sweden, and the collection in the Royal Library in Stockholm. Besides these there are a few manuscripts in the University Library in Christiania, Norway, in the British Museum in London, the Bodleian Library in Oxford, the Advocates' Library in Edinburgh, in Wolfenbüttel and Tübingen, Germany, in

Utrecht, Holland, in Vienna and Paris. No manuscripts of importance whatever have been left in Iceland, with the exception of the Reykjaholt inventory, which is a single quarto leaf of parchment preserved in the public archives in Reykjavik.

The most predominant characteristics of Old Icelandic as a Scandinavian language are, in the main, the following. To an extent unknown to the other members of the Germanic group Icelandic exhibits a consistent and widely developed process of assimilation in consonants and vowels, under this head falls the extraordinary extension of umlaut, which is here not merely a process of palatalization, as elsewhere in the Germanic languages, but of labialization as well. There are, besides this, a characteristic preference for suffixes, as exhibited in the use of the suffixed definite article with substantives, masc. *-nn*, fem. *-n*, neut. *-t*, the formation of an entirely new medio-passive conjugation by the suffixal use of the reflexive pronoun, and the expression of negation by an added *-gi*, *-a*, or *-at*. Other important characteristics are the universal shortening of the vowels of inflection and of derivation, the disappearance of final *n* in the so-called weak inflection of substantives and adjectives, and in the infinitive of verbs, whose accompanying preposition, furthermore, is *at*, instead of *du* (*zu*), as in the other Germanic languages, and the use of the consonantal case ending *-i*, elsewhere retained only in Gothic as *-s*, in masculine and feminine substantives. There are, in addition, many other minor peculiarities in sounds, inflections, and syntax. Contrasted with Old Swedish and Old Danish, whose earliest documentary remains date from 1281 and 1329 respectively, Old Icelandic possesses, as a whole, as is to be expected, a much more ancient character in sounds and in inflectional forms. It is, however, by no means invariably the most conservative. The far greater extension of the process of umlaut, e.g., in Old Icelandic, results in a large number of forms that are more recent than the corresponding ones in the other Scandinavian languages in their oldest period. The notably wide vocabulary of Old Icelandic shows some admixture of foreign elements. These are Latin words, introduced mainly through the Church after the Christianization of Iceland in the year 1000, Celtic words, introduced in considerable number as a result of the contact of Celtic-speaking people in the British Islands with the Norwegian settlers of Iceland, many of whom came by the way of Scotland, Ireland, the Orkneys, the Hebrides, and the Shetlands, where they had previously lived for longer or shorter periods, Anglo-Saxon words, which came in as a consequence of the close contact of Icelanders in England with the people, their language, and their culture, and finally, a few French and German words, due to the use in literature of foreign material, derived either directly or remotely from these sources.

The history of New Icelandic, or the present period of the language, begins with the Reformation, although the conditions that characterize it can already be observed in process of development in the transitional period at the end of Old Icelandic. The earliest literary monument of New Icelandic is the first Icelandic printed book, the New Testament, translated by Odd Gottskalksson, and printed at Roskilde in Denmark in 1540. In general, Icelandic has still retained, to the present time, along broad lines,

in inflections and vocabulary, its archaic characteristics, so that to-day it is on the whole the most ancient in appearance of the Germanic tongues. Since the beginning of the period the language has, however, in reality undergone a continual internal development. This is particularly true of the sounds, which have been very materially changed in pronunciation, although frequently the conservative retention of the old orthography gives no clew to it. What has helped Icelandic to retain its early conditions is, more than anything else, its relative isolation and the consequent minimum contact with other languages, on the one side, and the fact of its unbroken use in literature on the other. The production of literature in Iceland, although it dwindles in value and amount after the classical period until it is awakened to new life by the Reformation, has never wholly ceased since its very beginning. All this, with the continuous culture of the old literature, which has in some form or other never been forgotten, has tended to keep the language phenomenally pure and homogeneous throughout the island. After 1380, when Iceland, which since the end of the Republic in 1262 had belonged to Norway, fell with that country under the sovereignty of Denmark, a Danish influence was exerted upon the language which has continued, with varying effect, down to the present time. This influence was particularly active in the two centuries immediately following the Reformation, when, as a consequence of the reawakened literary activity, which brought with it many translations of foreign and especially of Danish books, it made itself felt in vocabulary and orthography to such an extent that the language seemed on the way to lose forever its characteristic purity. It was an appeal to the old literature which furnished the missing norm and not only checked the further introduction of Danicisms, but set on foot a reactionary tendency towards the forms and orthography of the classical period of the language. This puristic movement began towards the end of the eighteenth century, but was particularly furthered by the formation of the Icelandic Literary Society by the Danish philologist Rask in 1816. Since that time an influence has been carefully and intelligently exerted, both to eliminate foreign elements from the vocabulary, and either to rehabilitate old forms or to set in their place new forms made out of the old elements of the language, and to reform the orthography from the standpoint of etymology. A printed page of Icelandic at the present day has as a consequence a much more primitive character than the facts of its pronunciation actually warrant. In comparison with the other Germanic languages, changes have nevertheless been relatively few, and Icelandic, not only apparently but in reality, as it is in use to-day, is inherently the best preserved of this entire group.

The present territory of Icelandic, aside from small settlements in the United States and in British America, is the island of Iceland, where it is the spoken and written language of the 85,000 inhabitants. The literary language of the present time is to all intents and purposes the spoken speech, not of any particular region or of any separate class, but of the people of the whole country, with the reservation that in the capital and the trading places along the coast much Danish is in use, and the spoken language is no longer as pure as elsewhere. As

in the old period, there are no dialects in modern Icelandic, although there are still, as then, minor differences that give the language of certain parts of the country a local color.

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ICELANDIC LITERATURE. In order to understand the remarkable brilliancy of the classical Icelandic literature of the twelfth and thirteenth centuries, it is necessary to bear in mind the fact that the early settlers were among the cream of the Norwegian people. In spite of the political difficulties that had induced these hardy Norsemen to seek a home almost in the ocean itself, intercourse between Iceland and the Scandinavian peninsula continued to be very close, especially as a result of the frequent visits made to Norway by young Icelanders of rank. Another reason for the literary supremacy of the early Icelanders is closely connected with one of the principal natural drawbacks of the island, its severe climate, and the consequent isolation of the people during the greater part of the year.

Persons in Iceland were thus greatly thrown upon their own resources. As a result, the art of story-telling was resorted to for passing away the monotony of the dark winter days. The periodical meetings in summer were used for an interchange of news and of stories and poems, and to this day the Icelanders are probably the greatest lovers of oral literature. The Icelandic classics still form the most popular reading matter of the masses of the people. This vitality of the Icelandic literature is again closely connected with social conditions. The Icelanders are a homogeneous people, and in reading the accounts of the early heroes of Iceland they read the stories of their own ancestors, whose names have been familiar to them from early childhood. For them the long genealogies, which the most patient foreign reader finds tiresome, are full of interest as family records of the remote past, and the most insignificant detail is fraught with the vividness of personal association.

Turning to the literature itself, we find, as is the case with the other literatures of the world, that the earliest monuments are in verse form. The earliest monument of Icelandic literature, furthermore, the so-called *Elder Edda*, is, like our own *Beowulf*, the most important and interesting work produced, and claims, more than any other single work, the attention of Icelandic scholars. The *Elder Edda* is not a poem, in the strict sense of the word, but a collection of more or less closely connected poems of varying length and character, which were preserved for a long time by oral tradition, suffering inevitable changes in the process of transmission. For many centuries the manuscript containing the poems was forgotten, and on its discovery in 1643 it was attributed to the classical writer Sæmund, called the Wise, who lived in the last half of the eleventh and the first half of the twelfth century. It has since been proved conclusively that it was redacted by an unknown Icander. A curious error is also frequently repeated with regard to the etymology of the word *Edda* itself, which is explained as meaning 'great-grandmother'. As a matter of fact, the name was improperly extended from a prose work, the so-called *Younger Edda*, the work of Snorri Sturluson (qv). The age of the *Elder Edda* has been greatly exaggerated, the oldest portions probably belonging in their present form to the tenth century. (For an account of the poems, see *EDDA*.) The *Younger*, or *Prose Edda* is of great value, because of the information it gives of Icelandic mythology and the language of the early skalds. It is a sort of *ars poetica* and was compiled for the guidance of young poets. Its style is admirable, its tales of the gods and goddesses being related with a due attention to effect. The style of most of the early Icelandic poetry is in marked contrast to the simplicity and directness of the classical prose. The most complicated figures and the most obscure references are freely used. The form is alliteration combined with assonance, or the agreement of medial vowels. Most of the poems of the skalds are short, eight verses each, but some few longer poems occur. The most striking of the latter are the three poems by Egil Skallagrímsson, the hero of the *Egils Saga*. They are much simpler than the short poems by the same author, and are full of feeling and dignity. Egil's elegy on his son may be ranked among the great poems of the world. To the eleventh and twelfth centuries belong poems com-

posed in imitation of the ancient works, consisting of moral and didactic maxims—the former conceived from an assumed heathen, the latter from a Christian, point of view. In the thirteenth century the skaldic art declined and gave place to an inferior literature based upon biblical stories and legends of the saints. Two centuries later appeared the *vísa*, or ballad, which closely resembles in form and subject matter the ballad as found on the Continent. These continued in popularity until the seventeenth century. Frequently the classical sagas were paraphrased in these *vísa*s.

The earliest Icelandic prose belongs to the beginning of the twelfth century, when Ari the Wise (1067–1148) composed a history of his native island and its population in the *Íslendinga-bók* (The Book of the Icelanders), which is a revision of an earlier work by Ari. The value of this work is historical rather than literary, for its facts, while detailed and reliable, are not presented in an interesting style. It has been edited, with a German introduction and notes (Halle, 1891). The *Landnámabók* (Landtaking Book), also by Ari, is based upon the earlier *Íslendinga-bók*. It describes the discovery and settlement of Iceland and contains detailed accounts of 3000 persons and 1700 places. It was continued by others. There is an English translation by T. Ellwood (London, 1898). These works entered largely into the composition of the annals of the early kings of Norway, composed a century later by Snorri Sturluson (qv), under the title of the *Heimskringla* (Circle of the World), the opening word of the work. This work deserves special notice as being the most important historical contribution of the Middle Ages. It is characterized by a vivid style, and so strongly does it appeal to the Icelandic consciousness that it is still the most popular book after the Bible in Iceland. A new translation into Dano-Norwegian has been made (1900) by G. Storm, and published with a subvention by the Norwegian Parliament. The best edition in the original is that edited by F. Jónsson (1893–1901), who has also edited a shorter edition (1911). A continuation of the *Heimskringla* was composed by several authors. It has twice been translated into English—by David Laing (London, 1844 and 1889) and by W. Morris and E. Magnusson (ib., 1895). Other histories belonging to a later period are *Flateyrbók*, containing a rather confused selection of sagas, the *Færeyingasaga*, which tells of the introduction of Christianity into the Faroe Islands (trans. by F. York Powell, 1896), and the *Orkneyingasaga*, relating the history of the earls of Orkney. The parts of the *Flateyrbók* relating to the discovery of America have been edited by A. M. Reeves in *The Finding of Vineland the Good* (London, 1890). The compilation of the laws of the island attracted the attention of the Icelanders at an early period, and in 1118 a complete code, known as the *Grágás* (gray goose), which had been derived from the ancient Norse law, was submitted to the Althing, or popular assembly, and in 1123 the canons of the Church, or the *Kristinnættir*, were settled and reduced to writing. A collection of these enactments in the ancient and subsequent codes has been made by Stephensen and Sigurdsson, under the title of *Lovsamling for Island* (21 vols., Copenhagen, 1853–89).

Of hardly inferior interest to the *Edda* and the *Heimskringla* are the sagas (qv). This

term in its broadest sense includes all Icelandic prose works of a narrative character. Thus, strictly speaking, Ari's works cited above are sagas, as is also the *Heimskringla*. But, as generally used, the term "saga" is applied to shorter narratives the interest of which centres in one person. The scene of the saga may be laid either wholly or in part in Iceland, or occasionally altogether outside of Iceland. Sagas are divided into several classes, the first of which is the mythic-heroic. The representatives of this class often give a later version of some well-known story which appears in other literatures. This is notably the case with the most interesting representative, the *Völsunga Saga*, earlier traces of which appear in the *Eddas*, and a later version in the *Nibelungenlied* (qv). It has been translated by W. Morris and E. Magnusson (London, 1888). The *Vilkina Saga*, treating of Dietrich of Bern, is later and shows German influence. The *Fridthofs Saga* is of special interest as being the earliest version of the story made famous by the Swedish poet Tegnér (qv). A number of legendary stories were translated into Icelandic prose, the most important of which is the *Saga of Balaam and Josaphat* (qv). The second and most characteristic class of sagas are the family sagas, accounts of individual men and their families. These biographies, as they would now be called, deal with the earliest settlers of the island and extend to about 1050. They are marked by great simplicity of style, with frequent highly dramatic passages, extreme detail, especially in connection with genealogies and chronologies, and keen characterization. A striking feature of all the sagas is the introduction of verses supposed to be the work of the characters. This is particularly noticeable in the *Kormaks Saga*, which contains an average of over one poem to each page. The family sagas are subdivided into two classes, the larger sagas and the smaller sagas. To the first belong the *Njáls*, the *Egils*, the *Laxdæla*, and the *Eyrbyggja*. Of these, the first has been admirably translated by G. Webbe Dasent (New York, 1912), and the last was translated in a condensed form by Sir Walter Scott. The *Egils Saga* has been edited with a German introduction and notes by Finnur Jónsson (Halle, 1894), and in the same series the *Laxdæla Saga* has appeared, edited by Kr. Kaalund (1896). Among the smaller sagas the most interesting are the *Kormaks Saga* and the *Saga of Gunnlaug Serpent Tongue*, both of which are love tales. Apart from their literary qualities, the Icelandic sagas are of great value in throwing light upon many Old Norse customs—religious, legal, and social—that would otherwise be entirely unknown. This is especially true of the *Eyrbyggja*. For the English reader, the introduction to Dasent's translation of the *Egils Saga* is of interest in connection with the general subject of sagas.

Modern Icelandic literature begins with the introduction of printing (1530) by the last Roman Catholic Bishop of Iceland. The first Icelandic translation of the New Testament was made in 1540. During the seventeenth century many learned works were written, the leader in this movement being A. Grímur Jónsson (1568–1648). Many manuscripts were collected and copied, and communication between Icelandic and Danish and Swedish scholars was close. Grammars and dictionaries were compiled, and many antiquarian works were published. Among the principal scholars of this period were Thor-

mod Torfæus (1636-1719) and Arní Magnússon (qv). During this same period, and without interruption down to the present day, Iceland has produced a surprisingly large number of poets—a larger number, indeed, in proportion to the population, than any other country in Europe. Among these poets may be mentioned Hallgrímur Pjetursson (1614-74), the leading Icelandic psalm writer, Stefán Olafsson (1620-88), Eggert Olafsson (1726-68), and Jón Thorláksson (1744-1819). The latter made an excellent translation of *Paradise Lost* and Klopstock's *Messias*. Among nineteenth-century poets may be noted Bjárni Thórarensen (1786-1841), who is probably the most popular recent Icelandic poet, Jónas Hallgrímsson (1807-45), who introduced several foreign verse forms, notably the hexameter. Of the younger poets we may mention Gestur Pálsson (1852-91), Steingímur Thorsteinsson (1831-), Thorsteinn Erlingsson (1858-), and Hannes Hafsteinn (1861-). The most prominent dramatists are Matthías Jochumsson (1835-), also one of the most productive poets and translators, Indriði Einarsson (1851-), who began as a Romanticist, but in his later works shows strong Ibsenian influence, and Jóhann Sigurjónsson, whose *Fjalla-Eyvindur* (Eyvind of the Mountains) is the strongest Icelandic drama to date. The principal Icelandic novels are Jón Thoroddsen's *Pítur ok Stúlka*, translated by Reeves as *Lad and Lass* (London, 1890), and *Maður ok Kona* (Man and Wife).

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ICELAND MOSS (*Cetraria islandica*) A lichen found in cold climates, especially in Iceland and Norway, in which places it forms an important article of commerce. It is also met with on the higher mountains to the south, but is not collected in quantity. It is used largely as a food by the Icelanders and the Laplanders, who either powder the dried plant and make it into bread or boil it with milk. As food also it has been used in other countries to which it is exported. Before it becomes edible, however, it must be steeped in water to remove a bitter principle. Other uses are in the manufacture of sizing paper and in dressing the warp in weaving. Formerly it was used as a remedy

in pulmonary troubles, but is now regarded as a bland mucilaginous diet in such cases.

ICELAND SPAR. A transparent variety of calcite that is found chiefly in Iceland. Owing to its transparency and double refracting property, it is used for polarizing prisms and in other optical instruments. See CALCITE.

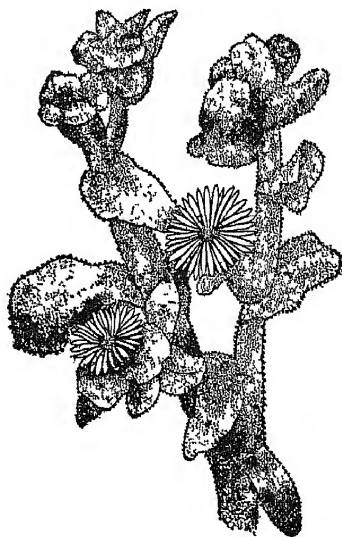
ICE MAKING. See REFRIGERATION, ICE INDUSTRY.

ICE NEEDLES. See FROST.

ICE'NI. A tribe of ancient Britain, occupying, as is supposed, the present counties of Norfolk and Suffolk. The Icení joined the ranks of Aulus Plautius in 43 A.D. and aided in the defeat of the sons of Cymbeline (qv). Some years later, when the Romans endeavored to establish their authority more firmly in the country, the Icení rebelled under their Queen, Boadicea (qv), but were subdued. Consult C. W. C. Oman (ed.), "England before the Norman Conquest," in his *History of England*, vol. 1 (New York, 1910).

ICE PACK. See ICE.

ICE PLANT (*Mesembryanthemum crystallinum*). A native of Africa and of the south of Europe, remarkable for the glistening bladder-shaped hairs with which its whole surface is covered, and which sparkle in the sun like granules of ice. The seeds are used for food in the Madeira Islands. The ashes supply barilla, which is extensively used as a source of carbonate of soda in soap and glass making, and for which the plant is burned in countries where it abounds. There are in all about 400 species of this genus, most of which are natives



ICE PLANT

of the south of Africa. The ice plant is introduced and spreading in southern California. *Mesembryanthemum æquilaterale*, a trailing plant, is also common in California, where its purple flowers, 1½ inches across, are very striking. *Mesembryanthemum edule* bears edible fruits called Hottentot figs.

ICE POLO. A game on skates, which should not be confounded with ice hockey nor with the equestrian game of polo, though it is related to both these games. While ice polo is similar in object to ice hockey, it is very different in

methods of play. A ball is used instead of a puck, the construction of the stick and the method of handling it are different, and there is a more open manner of play. This open play is brought about through the permission to indulge, in an ice-polo game, in what would in ice hockey be off-side play, i.e., getting between the ball and the opponents' goal. Five men make up a team, two less than in ice hockey. There are two rushers, one centre, one halfback, and one goal tend. The goals are 4 feet wide, and the distance from goal to goal is 150 feet. There are two playing periods of 20 minutes each, with 10 minutes' interval. A goal counts three points. See HOCKEY.

ICE YACHTING Excepting Russia, no country in the world shares with America the sport of ice yachting, and Russia is only a sharer in the sense that a few of its boats, such as those of the Russian River Club, are sailed over a portion of the Gulf of Finland, near St. Petersburg. As early as the year 1790 there were ice boats, and contests at Poughkeepsie on the Hudson, the runners of one of the boats being still preserved. It was built by Oliver Booth and was little more than a square box on three runner skates—one on each side of the box, and the rudder one set in an oak post with an oar tiller. It was sailed with a small flat-headed spritsail. More than half a century passed before there was much improvement in this primitive design. The first real innovation was that of Allaire of Red Bank, N. J., on the Shrewsbury River, who in 1856 mounted his three runners on a triangular frame—a pattern that was at once seen to give advantage over the previous method. From this the Hudson River boats were gradually developed, the side bars forming with the body a bridge or runner plank (at right angles with the body of the yacht) projecting on each side and carrying at each end one runner or skate. The mast was stepped at the junction of the runner plank with the main beam, and they had low sails with large jibs, short nonpeaked gaffs, and booms extending many feet out from the stern. This style reached its limit in 1869 in the old *Iceole*. The stepping of the mast over the runner plank placed the centre of effort so far aft that the boats would run away with their occupants and throw them out, sometimes to their great peril. In 1879 this class was practically superseded, on the Hudson River, by the *Robert Scott* type of a single backbone with an elliptical steering box. Then the mast was stepped forward of the intersecting runner plank, and the jibs and boom shortened. Improvements have continued, but mainly in construction, which has aimed at strength combined with lightness in backbone and masts, and springiness in the cross or runner plank—a very desirable condition, for if a runner under an ice yacht weighing 2000 pounds and going at 45 miles an hour strikes a hummock of ice and has no give or spring in it, the consequence may be a shock that will reduce the craft to pieces. In the year 1866 the lateen sail was adopted, both on the Hudson and Shrewsbury rivers. *Scud*, with the largest lateen ever rigged, was sent from the Shrewsbury to Poughkeepsie on the Hudson and entered for the pennant several years. She, as well as *Arrel* and *Blizzard*, was exceedingly fast, but without apparent reason they would spin round on their heels like tops, or bolt, and in spite of its many admittedly good qualities

and undoubted speed, the rig lost supporters. Theoretically any sailing craft should do its best with all its canvas in one piece. *Flying Scud* modified the lateen by spreading its 615 feet of sail, or catboat fashion, by supplementing it with a small jib, and *Vixen* and *Range* had other developments of the lateen. The lateen sail has still some staunch friends. The *George* of the Shrewsbury River fleet, and Colonel Higginson's *Cold Wave*, with the Mobergan cat rig, are two examples of it.

The latest design in runners is that of H. Percy Ashley, known as the rocker type. These have a curve fore and aft. They are especially useful on rough ice. The elongated tiller, too, is of the utmost importance on occasions, because it allows the sailor to lie head forward in the steering box and guide the yacht with his feet while yet tending sheet with his hands.

The usual course in races is a triangle of one mile on each leg, of which only one can be before the wind, and five times around the triangle constitutes a heat. This necessitates 14 sharp turns. The time made by boats over such a course necessarily varies very much on each leg, and still more from day to day, according to the condition of the ice and the force and direction of the wind. The world's record for speed over a two-point course was made in 1907 at Kalamazoo, Mich., by the *Wolverine*, of the Kalamazoo Ice Yacht Club, which sailed a 20-mile course in 39 minutes 50 seconds, the boat being obliged to turn every two miles. The exact distance sailed is unknown. The fastest time made in the pennant championship was in 1893 by *Jack Frost*, which sailed a 20-mile course in 49 minutes, 30 seconds, or at the rate of a mile in 2 minutes, 28 seconds, but the calculated distance the yacht sailed was 31.38 miles, and her rate was therefore a mile in 1 minute, 34 seconds. Much faster time has been made on a straight-away course in a favorable wind. In Stone's *Ice-Boating*, Archibald Rogers reports his test of several small boats over a measured mile. He says "the best record was 59 seconds. Estimated speeds, that is, sailing up or down the river between known landmarks, have given still higher rates of velocity, in one instance a passage was made by two yachts racing on a reach where the time made was believed to be at the rate of 84 miles per hour."

The principal original locations for ice yachting are the Hudson River above Poughkeepsie, Newburgh, and Orange Lake, N. Y., the Shrewsbury River in New Jersey. From these the sport spread westward in the sixties to Lake Minnetonka, Minn., where it was introduced by Theodore Wetmore, and much fine sport has been had by yachtsmen from St. Paul and Minneapolis. Lake Winnebago, Wis., has also a half-dozen clubs on its borders. Lake Pepin, about 40 miles south of St. Paul, is the centre for the boats of several towns, and there is much racing on Gull Lake at Kalamazoo, Mich., and along the American shores of Lake Erie and Lake Ontario. There is excellent sport at Burlington, Vt., on Lake Champlain.

There are many prizes annually competed for; but as ice yachts are by their nature difficult to move from watershed to watershed, they are mostly local. For a series of informing articles on the history and development of the ice yacht, with precise directions for the construction of various types of the craft, consult Stone, *Ice-*

Boating (New York, 1913), and H P Ashley, *How to Build an Ice Yacht* (ib, 1914)

ICHABOD, ik'a-bōd A poem by Whittier, intended as a rebuke to Daniel Webster for his change of attitude towards the question of slavery

ICHANG, ē'chang', or **ECHANG** A *fu*, or departmental city, of the Province of Hupeh, China, situated on the left bank of the river Yang-tse, about 1000 miles from the sea, and about 10 miles below the entrance to the great Yang-tse Gorges (Map China, K 5) It stands in the centre of a hilly country rich in rice, cotton, wheat, barley, and wood-oil trees (the *Tung-shu*, or *Aleutites cordata*), and many kinds of fruit grown in the sheltered valleys near by The climate is dry, with warm summers and pleasant winters

The place is of great commercial importance, as the river may be navigated with comparative ease up to this point by vessels of light draft The few attempts that have been made to mount the rapids of the upper Yang-tse have resulted in disaster Hence all cargoes destined upstream are here transhipped to craft specially constructed for the navigation of the river above Ichang, and most of the downstream cargoes from Szechwan are also transhipped The city is one of four opened in 1877 to foreign residence and trade, in accordance with the convention signed at Chefoo in 1876, and a few foreign business houses have agents here Great godowns or warehouses have been built to accommodate this transit trade, and a foreign settlement has been laid out just below the native city In 1912 the total imports of Ichang amounted to hk tls 2,065,825 (in 1912 a tael was worth \$0.70 United States gold), and total exports to hk tls 3,487,070, making the total trade of the port in that year hk tls 5,552,895 Of the imports, hk tls 1,150,530 came from foreign countries, and hk tls 915,275 from Chinese points An immense amount of produce from the Province of Szechwan is reshipped at Ichang for ports downstream and upstream

Steamer traffic is mainly in the hands of the British and Chinese Some 19,000 native craft of all sizes (the largest probably about 60 tons) pass this port or call at it in the course of the year, the river being practically the only way of reaching the rich coal fields and fine agricultural lands of Szechwan, and the northern parts of Kweichow and Yunnan Ichang has a splendid location as an emporium for the exchange of goods and products, but Hankow and Shanghai far excel it in that respect The population numbers about 55,000 A route for a railway from Ichang to Hankow was surveyed in 1905 By December, 1914, a distance of 80 miles from Ichang had been constructed A railway from Ichang to Hankow is now contemplated

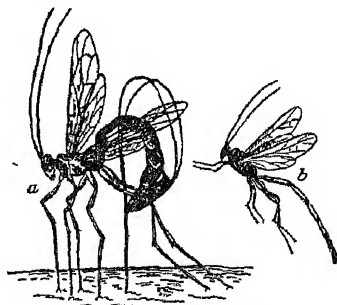
ICH DIEN, ik dēn (Ger, I serve). The motto of the Prince of Wales, which, surmounted by three ostrich feathers (originally one), forms his official crest According to one theory of its derivation Edward I, on presenting his new born son, Edward of Carnarvon, to the Welsh, who had demanded a native-born prince, used the expression in its Welsh signification—*Eich dyn* (Behold your man) Another view, not historically verified, attributes it to the occasion of the killing of John, King of Bohemia, by the English at Crécy, and asserts that the Black Prince found the motto under the plume worn by the dead King and assumed it

to imply that "he served under the King, his father"

ICHIJI, ē'chē'jē', H (1860-1912). A Japanese naval officer He entered the Japanese naval college in 1874, was naval attaché in Rome during the Chino-Japanese War, and became captain in 1900 In 1903 he was appointed captain of the *Nikasa*, he served as flag captain under Admiral Togo during the Russo-Japanese War, and became rear admiral in 1906 and vice admiral in 1910 He twice commanded the Japanese training squadron which visited Australia and the United States between 1906 and 1909 At the time of his death he commanded the naval station at the Pescadores and was a member of the Admiralty Board

ICHNEUMON, ik-nū'mōn (Lat, from Gk *ἰχνεύμων*, *ichneumōn*, tracker, from *ἰχρεῖν*, *ichneuein*, to track, from *ἰχνος*, *ichnos*, track) An old name for the civet of the genus *Herpestes*, now generally called mongooses (See Mongoose) The name belongs specifically to the Egyptian mongoose, or "Pharaoh's cat" (*Herpestes ichneumon*)

ICHNEUMON FLY An insect of a group of parasitic Hymenoptera, forming the family Ichneumonidae More than 2000 genera and 25,000 species of ichneumon flies have been described Economically considered, they are among the most important groups of insects, since without exception they are parasitic upon or within other insects, and in the very great majority of instances they destroy injurious species As a rule, the ichneumon fly lays her eggs beneath the skin of the host insect The egg hatches, and the young footless grub feeds upon the fat and blood and lymph of the host, piercing the fatty tissue with a pair of sharp-pointed jaws It respects the viscera and vital organs



A LARGE ICHNEUMON FLY

Male (b) and female (a) of *Thalessa lunator*, in relative size, the latter in the act of forcing her ovipositor into a log

of the host up to the last limit and only sacrifices them towards the completion of its growth Its skin is very delicate, and it breathes by absorbing oxygen through this skin from the blood of the host insect and not, as the older writers supposed, by placing itself in communication with the tracheae of the host The digestive tube has a very large stomach, which is closed behind and remains closed until the larva is full grown When this time is reached, and the larva transforms to pupa, a rectal opening is formed, and the excrement is voided That such an economy as this is necessary to the life of the parasitic larva is at once seen when we consider that if the excrement were voided daily it would cause speedy inflammation and the death of the host insect before the parasite could

become mature It was formerly supposed that for this same reason the parasitic larva did not cast its skin, but Seurat has recently shown that some of them do occasionally molt

Some ichneumon flies lay their eggs on the skin of the insects they attack, and others near the host insect, so that the parasitic larva, after hatching, finds its way to its prey When the host insect is an internal feeder, like a wood borer or a gall insect, the ichneumon larva lives upon instead of within the host There is no uniformity in the degree of rapidity with which they develop, and they may pass the winter months either as larvæ, pupæ, or adults As a rule, they are long-bodied, slender insects, varying much in size Many of them have long, stinglike ovipositors—in some instances, as in *Rhyssa*, more than twice as long as the body

Both the scientific and popular names of this group of insects were derived from the Egyptian ichneumon, or "Pharaoh's iat," which devours the eggs and young of the crocodile

Consult Comstock, *Manual for the Study of Insects* (Ithaca, 1885), Sharp, *Cambridge Natural History*, vol v (London, 1895), Ashmead, "Classification of the Ichneumon-Flies," in *Proceedings of the United States National Museum* (Washington, 1900), Viereck, "Type Species of the Genera of Ichneumon Flies," in *United States National Museum, Bulletin* 83 (ib, 1914) See COLORED PLATE OF INSECTS

ICHTHOLOGY, ik-nól'ô-jî (from Gk *ἰχθυος*, *ichnos*, trace + *-λογία*, *-logia*, account, from *λέγειν*, *legen*, to say) The study of fossil footprints, tracks, trails, and impressions found in the rocks of various geological ages The most prolific sources of such footprints and impressions in North America are the Jura-Trias sandstones of Massachusetts, Connecticut, and New Jersey Prof Edward Hitchcock gathered a great collection of them from the New England localities and placed it in the Amherst College Museum This collection contains over 8000 tracks, and it furnished the material for Hitchcock's *Ichthyology of New England A Report on the Sandstone of the Connecticut Valley, especially its Fossil Footmarks* Many of the tracks therein described were first supposed to have been made by birds, but they are now known to be the footprints of ornithomimid dinosaurs like *Anchisaurus* (q v) Still others were made by heavy five-toed animals of unknown nature Some of the smaller tracks were made by insect larvæ which are found in the same series of deposits (See MORMOLUCOIDES) For an entertaining account of fossil footprints, see the chapter on "Impressions of the Past," in F A Lucas, *Animals of the Past*, "American Museum of Natural History, Handbook Series, No 4" (New York, 1913), also consult Lull, "Nature's Hieroglyphics," in *Popular Science Monthly* (ib, 1904) See FOSSIL, JURASSIC SYSTEM, TRIASSIC SYSTEM

ICHTHYOCRINUS, ik'thî-ôk'ri-nûs (Neo-Lat, from Gk *ἰχθύς*, *ichthys*, fish + *κρίνον*, *kérnon*, lily) The representative genus of the important family Ichthyocrinidae of the Crinoidea In this family the base is dicyche, the radials are succeeded by costals which increase in size upward, the brachials are united by more or less wavy sutures, and the arms are nonpinnate In *Ichthyocrinus* the radials and lower brachials are laterally in contact, as all sides and the crown appear like a perfectly solid body when the short arms are closed. The genus extends

from the Silurian to the coal measures and is found both in Europe and America, but is best known by its representatives in the Niagara group See CRINOIDEA

ICHTHYODORULITES (pl, from Neo-Lat from Gk *ἰχθύς*, *ichthys*, fish + *δόρυ*, *dory*, spear + *λίθος*, *lithos*, stone) The fossil spines of sharks, which are often found isolated in the ancient rocks Many of them are of large size and because of their hardness and phosphatic nature have been preserved with a considerable degree of perfection Some of them are well known under the names *Ctenacanthus*, *Mæcaracanthus*, *Plemacanthus*, *Cyracanthus*, etc Some of these spines have been found in their original positions at the front edges of the fins of fossil sharks See SHARK

ICHTHYOL, ik'thî-ôl (from Gk *ἰχθύς*, *ichthys*, fish), or AMMONIUM ICHTHYOL-SULPHONATE A dark-red oily liquid obtained from a bituminous quartz rich in fossil fish, found in the Tirol and on the coasts of the Adriatic Sea To prepare the drug, the mineral is distilled with strong sulphuric acid, a saturated aqueous solution of common salt is added to the distillate, and the ichthyol-sulphonic acid which separates out is neutralized with ammonia The ichthyol thus obtained has a disagreeable bituminous odor and taste and is soluble in water, in glycerin, and in various oils It is an antiseptic, mild irritant, and somewhat of a styptic It is absorbed with ease by the skin when applied externally and by the intestinal mucous membrane when administered internally It is one of the best-known remedies for eczema, in which disease it is applied externally in the form of an ointment made up with lanolin The same preparation is highly recommended for cases of acute articular rheumatism, as affording prompt relief by reducing the pain and the swelling Unna has declared it to be the remedy par excellence in acne He applies it externally in the form of a 15 per cent ointment and gives it internally in doses of from 2 to 10 grains in pills or in capsules, he also recommends the free use of ichthyol soap Ichthyol is extensively employed in the treatment of various skin diseases and is said to be particularly efficacious in eczema, chronic urticaria, and simple syphilis It is frequently prescribed, with success, as a local application in chronic nasal catarrh, especially in the form known as ulcerative rhinitis The formula of ammonium ichthyol-sulphonate is supposed to be $C_{25}H_{26}S(SO_3NH_4)_2$ But the ichthyol ordinarily sold contains also a strongly smelling oil, some ammonium sulphate, and a great deal of water Ichthyol can be freed from its disagreeable odor without in the least impairing its therapeutic power, and at present such an ichthyol preparation is to be found in the pharmaceutical market

ICHTHYOLOGY, ik'thî-ôl'ô-jî (Gk *ἰχθύς*, *ichthys*, fish + *-λογία*, *-logia*, account, from *λέγειν*, *legen*, to say) That branch of natural history which treats of fishes See FISH

ICHTHYOPHAGI, ik'thî-ôf'a-jî (Lat nom pl, from Gk *ἰχθυοφάγοι*, *Ichthyophagoi*, fish eaters, from *ἰχθύς*, *ichthys*, fish + *φαγεῖν*, *phagein*, to eat) Among the ancient Greeks, a name for various tribes of coast dwellers on the southern seas, eg, in Asia, on the coast of southern China, Gedrosia, and northeastern Arabia; in Africa, on the west coast of the Arabian Gulf and in Senegambia

ICHTHYOPSIDA, ik'thî-ôp'si-da (Neo-Lat,

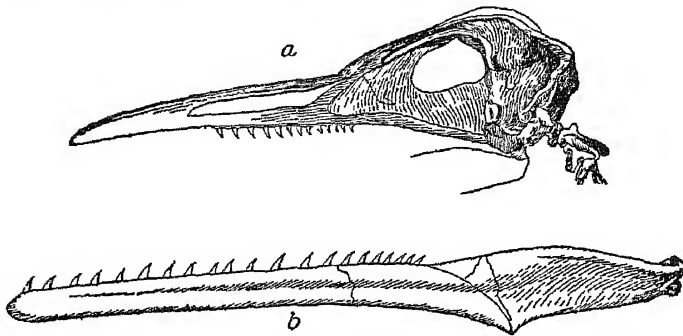
from Gk *ἰχθύς*, *ichthys*, fish + *ὄψις*, *opsis*, appearance) A division of the Vertebrata, including all such forms as have no amnion and allantois, but which have, either persistently or temporarily, gills as their respiratory organs. The group includes the Amphibia (qv) and the fishlike forms. This division was introduced by Huxley.

ICHTHYORNIS, *ik'thi-ōr'nis* (Neo-Lat., from *ἰχθύς*, *ichthys*, fish + *ὄψις*, *opsis*, bird). A genus of toothed birds of the Cretaceous age, found fossil numerously in western Kansas, along with remains of *Hesperornis*, *Aptornis*, and the like. These two genera represent the division Odontotormæ of the toothed birds (see BIRD, FOSSIL), characterized by having the teeth, with which the mandibles were plentifully furnished, set each in a separate alveolar socket. The various species were birds not greater than a pigeon in size and resembling terns in general appearance and probably in habits. They were sea birds of powerful flight, and the structure of their wings, legs, and carinate sternum much

triangular fin at the middle of the back. The body was covered with thin, smooth skin, and no traces of dermal plates have been discovered. The jaws were armed with a large number of sharp, conical teeth that have a complicated internal structure similar to that of the teeth of Labyrinthodonts or Stegocephala. The eyes are surrounded by circles of sclerotic bones, and there is a large pineal foramen on top of the skull between the eyes. The vertebrae are biconcave, and the pelvic arch is separated from the vertebral column, for there is no sacrum. In size they ranged from 4 to 40 feet, and they must have swarmed in immense numbers in some portions of the European seas, especially during Liassic time, for their remains have been found in abundance in deposits of that age at Lyme Regis, England, and in Wurttemberg, Germany. That they were predacious animals and fed largely on fish, is evidenced by the fish fragments found within their coprolites and also within the abdominal cavity of some skeletons. Some ichthyosaurs were viviparous, for specimens obtained in the Wurttemberg quarries show several small embryonic skeletons contained in the abdominal cavities of the adults. About 35 species of *Ichthyosaurus* are known, and they have been found in the Mesozoic deposits of Europe, the East Indies, Australia, New Zealand, and South America. Allied genera are *Mosasaurus*, of small size from the Trias, and *Ophthalmosaurus*, a toothless ichthyosaur from the Upper Jurassic and Lower Cretaceous. A single representative, *Baptanodon*, is found in the North American Jurassic and is very close to *Ophthalmosaurus*. The ichthyosaurs and their allies, together with the Sauropterygia, comprising the plesiosaurs and allied forms, were formerly included in an order Enaliosauria, which is not now recognized.

Bibliography. Owen, *Monograph of the Fossil Reptiles of the Liassic Formation Part III, Ichthyopterygia* (London, 1881), Nicholson and Lydekker, *Manual of Paleontology*, vol. 11 (Edinburgh, 1889), Fraas, *Die Ichthyosaurier der sudeutschen Trias und Jura Ablagerungen* (Tubingen, 1891), Woodward, *Outlines of Vertebrate Paleontology for Students of Zoology* (Cambridge, 1898), Merriam, "Triassic Ichthyosauria," in *University of California, Memoirs*, vol. 1 (Berkeley, 1908), Knipe, *Evolution in the Past* (London, 1912). See REPTILE.

ICHTHYOSIS, *ik'thi-ō'sis* (Neo-Lat., from Gk. *ἰχθυόσις*, from *ἰχθύς*, *ichthys*, fish), or FISH-SKIN DISEASE. A disease characterized by a hardened, thickened, rough, and almost horny state of the epidermis, which breaks into small, irregular, scalelike pieces, which do not readily exfoliate, but which if removed are speedily reproduced. In the localities less profoundly altered by the ichthyotic condition, there is hypersecretion of sweat, in the hardened and thickened places many sudoriparous glands are suppressed, and the surface is dry. The disease may affect almost the whole surface or may be confined to a single part, and is most frequently, but not always, congenital. It is attended with



SKULL OF ICHTHYORNIS

a, cranium and upper mandible of *Ichthyornis regalis*, b, lower mandible of the larger *Ichthyornis victor*

resembles that of modern birds. The skull, however, retains many reptilian features besides the teeth, such as the diminutive elongated space for the brain, the single-headed quadrate bone, and the union of the lower jaws in front by a ligament. The vertebrae, also, differ from those of *Hesperornis* and all modern birds in being biconcave. This form of vertebra is seen in a few recent and many extinct reptiles, but is especially characteristic of fishes, the presence of this character alone would indicate the very antique origin of the group. These birds doubtless lived and fed as do modern gulls, seizing living fishes, and going ashore only to breed and roost at night. They were doubtless well feathered and seem to have flourished until the end of the Cretaceous era. Most of the fossil remains thus far obtained are in the museums of Yale University and of the University of Kansas. See HESPERORNIS, and consult the authorities there referred to.

ICHTHYOSAURUS, *ik'thi-ō-sa'rūs* (Neo-Lat., from Gk. *ἰχθύς*, *ichthys*, fish + *σαῦρος*, *sauros*, lizard). An extinct genus of fishlike reptiles found in the Mesozoic rocks of Europe and North America. The ichthyosaurs among reptiles are analogous to the whales among mammals, and they have many points of resemblance to these. Their bodies were round and tapering, heads large, with long snouts and very short necks, limbs reduced to paddles, and they had a broad, vertical fin on the tail and a

no constitutional disturbance. The disease is extremely obstinate and when congenital may be considered as incurable. The treatment consists in the frequent use of the warm or vapor bath, so as to soften the thickened epidermis and to facilitate its removal, and friction by means of a piece of flannel may be conjoined with the bath. The internal administration of tar, cod-liver oil, etc., sometimes gives relief.

ICHTHYS, ik'this (Gk *ἰχθύς*, *ichthys*, fish). An early Christian symbol. It was discovered that the Greek word for fish consisted of the first letters of the common ascriptive title to Christ: Jesus Christ, the Son of God, the Saviour, or in Greek Ἰησοῦς Χριστὸς Θεοῦ Υἱὸς Σωτήρ. A fish thus became the symbol of Christ, and to make the sign of a fish was to give to the initiated the plainest indication of being a Christian. Accordingly it entered into the freemasonry of early Christianity. Both the acrostic and the figure of a fish appear upon the monuments.

ICICA, is'i-ka. See **PROTIUM**.

ICILTIUS. The name of a plebeian family in Rome, which produced some of the most zealous defenders of the plebeians against the patricians. The name of one of them, betrothed to the unfortunate Virginia, is associated with one of the most touching incidents in the legendary history of Rome. See **APPIUS CLAUDIUS CRASSUS**.

ICILIUS, QUINTUS. See **GUICHARD, K. T.**
ICKELSAMER, ik'el-sa'mēr, VALENTIN (c 1500-c 1537). A German grammarian. Nothing definite is known of his life. He was perhaps born at Rothenburg-an-der-Tauber, at any rate, about 1525 he was schoolmaster there. From the title-page of one of his works we may gather that he lived for a time, possibly as schoolmaster, at Kailstadt. Afterward he lived at Erfurt and at Augsburg. His two principal works were *Rechte Weis auff's künztlich lesen zu lernen* (c 1527), the foundation of the German phonetic method, and *Teutsche Grammatica* (written c 1527, but published with neither date nor place), one of the earliest German grammars. Both these books are reprinted in Müller, *Quellenschriften und Geschichte des deutschsprachlichen Unterrichts* (Gotha, 1882). Consult Vogel, *Leben und Verdienste V. Ickelsamers* (1894).

ICKNIELD (ik'nēld) **STREET, or WAY**. An ancient road running from Cornwall to Norfolk in England. The name is connected with the Iceni. See **FOSSWAY**.

ICOLMKILL, ik'om-kil'. See **IONA**.

ICON BASILIKE, i'kōn ba-sil'i-kē. See **BYZANTINE BASILICA**.

ICONIUM. A town of Asia Minor. See **KONIEH**.

ICONOCLASM (from Gk *εἰκών*, *eikōn*, image + *κλάν*, *klan*, to break). The name given to any movement against the religious use of images, but especially to the crusade against their use which excited the whole Eastern church in the eighth century, dating in its definite character from a decree of the Emperor Leo, the Isaurian, which enjoined the destruction of such images. The question was settled by ecclesiastical authority at the second Council of Nicaea (787) (qv), when the cult of images was sustained as veneration, not adoration. In 811, under a new line of iconoclastic emperors headed by Leo V, the controversy raged anew till 842, when images were restored by Imperial com-

mand. There was also some iconoclastic trouble after the second Council of Nicaea in the Frankish church. During the Reformation the Protestant revolt against images in the churches caused iconoclasm both on the Continent and in England. Consult Schwartzlose, *Der Bilderstreit* (Gotha, 1890), and Harnack, *History of Dogma*, vols. III, IV, V (Boston, 1897-99). See **IMAGE WORSHIP**.

ICONOCLAST. The nom de plume of Charles Bradlaugh.

ICONOCLAST EMPERORS. The Byzantine emperors by whom the contest against iconolatry in the Eastern church was waged. Leo III the Isaurian, Constantine V, Leo IV, Leo V the Armenian, and Theophilus.

ICONOGRAPHY. A term originally used, in its etymological sense, to signify the science of antique portraiture, i.e., the discussion, enumeration, and history of the portraits of prominent persons in statues, busts, paintings, coins, gems, etc. This science was first resurrected by Michelangelo and Fulvius Ursinus, and further developed by Canini, in his *Iconografia* (Rome, 1669), and especially by Visconti in a series of monumental works cited below. The term "iconography" is occasionally applied to the portraits or images of mythological personages and objects of antiquity—a subject generally treated in the article **MYTHOLOGY IN ART**. Its chief use, however, is in reference to the attributes, emblems, and symbols with which Christian deities, saints, and conceptions are represented in art.

Christian Iconography. In the early Christian centuries the representations were few in number and quite simple, leaving much freedom to the artist. They embraced subjects like the "Good Shepherd" and the emblems of faith, familiar to all. In the fourth and fifth centuries iconography became more complicated. The clergy began to use it as a factor of systematic religious instruction, controlling the representations which were now executed in strict accordance with formulas. Christ, as King of Heaven, was by far the favorite subject from the fourth to the seventh century, while from the eighth to the twelfth the "Last Judgment" and scenes from the Revelation were in vogue. There were two schools—the Eastern, or Byzantine, and the Western, or Latino-German. The former was by far the most original and important, dominating not only the East, but Europe during the Carolingian period, and remaining supreme in Italy until late in the Gothic age. It found its expression in mosaics, frescoes, and illuminated manuscripts, sculpture being excluded as a result of the iconoclastic conflict. (See **BYZANTINE ART**.) The iconography of the Romanesque (qv) period was meagre and unsystematic, but during the Gothic age an independent Western system originated in France, spreading throughout Europe. In the North it found its chief expression in the sculptures of the great cathedrals and endeavored to represent the encyclopædic conceptions of the scholastics. (See **GOTHIC ART**.) In Italy it manifested itself chiefly in painting. Iconography remained under clerical control until, with the Renaissance, the human element superseded the divine, the old subjects being used as a means for the expression of human feeling and artistic ability. The old subjects from biblical history, especially those illustrating the plans of salvation and those from the lives of the saints, continued

to be used, the most popular subject being the Madonna with the Christ Child, represented as an earthly mother or in more divine attitudes. The more important subjects of Christian iconography are treated under separate titles, like CHRISTIAN ART, JESUS CHRIST IN ART, HOLY FAMILY. For the important part played by emblems and symbols in iconography, see the article SYMBOLISM, and such special articles as AUREOLE, NIMBUS, ETC.

Bibliography. The foundations of the modern science of Christian iconography were laid by Didron, *Iconographie chretienne, grecque et latine* (Paris, 1845, Eng trans in Bohn's Library, based on the treatise of the Byzantine monk Dionysos (London, 1851). Consult Durand, *Histoire de Dieu, iconographie des personnes divines* (Paris, 1844), and Wessely, *Iconographie Gottes und der Heiligen* (Leipzig, 1875). The best modern works are Barbier de Montault, *Traité d'iconographie chretienne* (Paris, 1890), Detzel, *Die christliche Ikonographie* (Freiburg, 1895). There is no scholarly work on the subject in English, but a number of popular treatises, such as A B Jameson, *Sacred and Legendary Art* (2 vols, London, 1863), C E Clement, *Angels in Art* (Boston, 1898), *Saints in Art* (ib, 1899), N R E Bell, *Lives and Legends of the Evangelists, Apostles, and other Early Saints* (New York, 1901), id, *Lives and Legends of the Great Hermits and Fathers of the Church* (ib, 1902). A good brief manual, alphabetically arranged, is by Liefmann, *Kunst und Heilige* (Jena, 1912). For iconography in the sense of classical portraiture, consult the monumental works of Visconti *Iconographie grecque* (3 vols, Paris, 1808), *Iconographie romaine* (3 vols, ib, 1818-20), Bernoulli, *Romische Ikonographie* (Stuttgart, 1882-91), *Griechische Ikonographie* (Munich, 1901).

ICONOSTASIS, i'kō-nōs'ta-sis. A screen in a Greek church or basilica, separating the sanctuary from the rest of the church, so called from the pictures (*icons*) of Christ, the Virgin, and saints usually placed upon it. It is usually a solid screen, with three doors hung with curtains which are dropped during the celebration of the Mass. The open screen of columns in St Mark's at Venice is often called the iconostasis, but with doubtful propriety. See BYZANTINE ARCHITECTURE, CHURCH.

ICTEROHÆMATURIA, ikt'ēr-ō-hēm'a-tū-rī-a (Neo-Lat, from Gk *iktēpos*, *ictēros*, jaundice + *haima*, *haima*, blood + *ouron*, *ouron*, urine), CARCEAG OR PIROPLASMOSIS OF SHEEP. A malignant disease of sheep in Europe, due to the action of (*Piroplasma*) *Babesia ovis*, a parasite of the red blood corpuscles closely related to that of Texas fever. In nature this protozoan parasite is transmitted from diseased to healthy sheep by a tick, *Rhipicephalus bursa*. The chief symptoms are fever, constipation followed by diarrhœa, bloody urine, jaundice of the eyelids, nostrils, and sometimes of the skin; and paralysis of the hind quarters. During the progress of the disease there is a decrease in the number of red blood corpuscles and an increase in the number of white corpuscles. Post mortem examinations reveal hemorrhagic inflammation, an acute swelling of the spleen, and parenchymatous degeneration of the liver and kidneys. The disease occurs in restricted localities, where it causes serious losses of sheep. It appears to be safe, however, to raise goats on such infected areas. Recovery from the disease conveys to

the sheep an immunity of long duration against new infection. Consult Hutyra and Marek, *Special Pathology and Therapeutics of the Diseases of Domestic Animals*, vol 1 (Amer ed, from 3d rev Ger ed, 2 vols, Chicago, 1912).

ICTERUS. See JAUNDICE.

ICTINUS (Lat, from Gk. *iktinos*). The chief architect of the age of Pericles, designer of the Parthenon (qv) at Athens, the great hall for the mysteries (Telesterion) at Eleusis (qv), and the temple of Apollo Epicurius at Phigalia (qv, see also PHIGALIAN MARBLES). He is said to have written an architectural treatise on the Parthenon.

IDA (Lat, from Gk *Idē, Idē, "Ida, Ida*). A mountain range of Asia Minor, extending through Phrygia and Mysia, now known as Kaz Dag. The Granicus, the Simois, the Scamander, and other streams famous in ancient story flowed from its sides. The highest peak was Mount Gargarus, 5748 feet, near the plain of Troy. Ida was an ancient seat of the worship of Cybele, who was hence called *Idæa Mater*. There was another Ida, almost equally famous, in Crete. This is now called Psiloriti. It rises to a height of about 8000 feet above sea level. Zeus is said to have been nurtured in a cave in this mountain. See JUPITER.

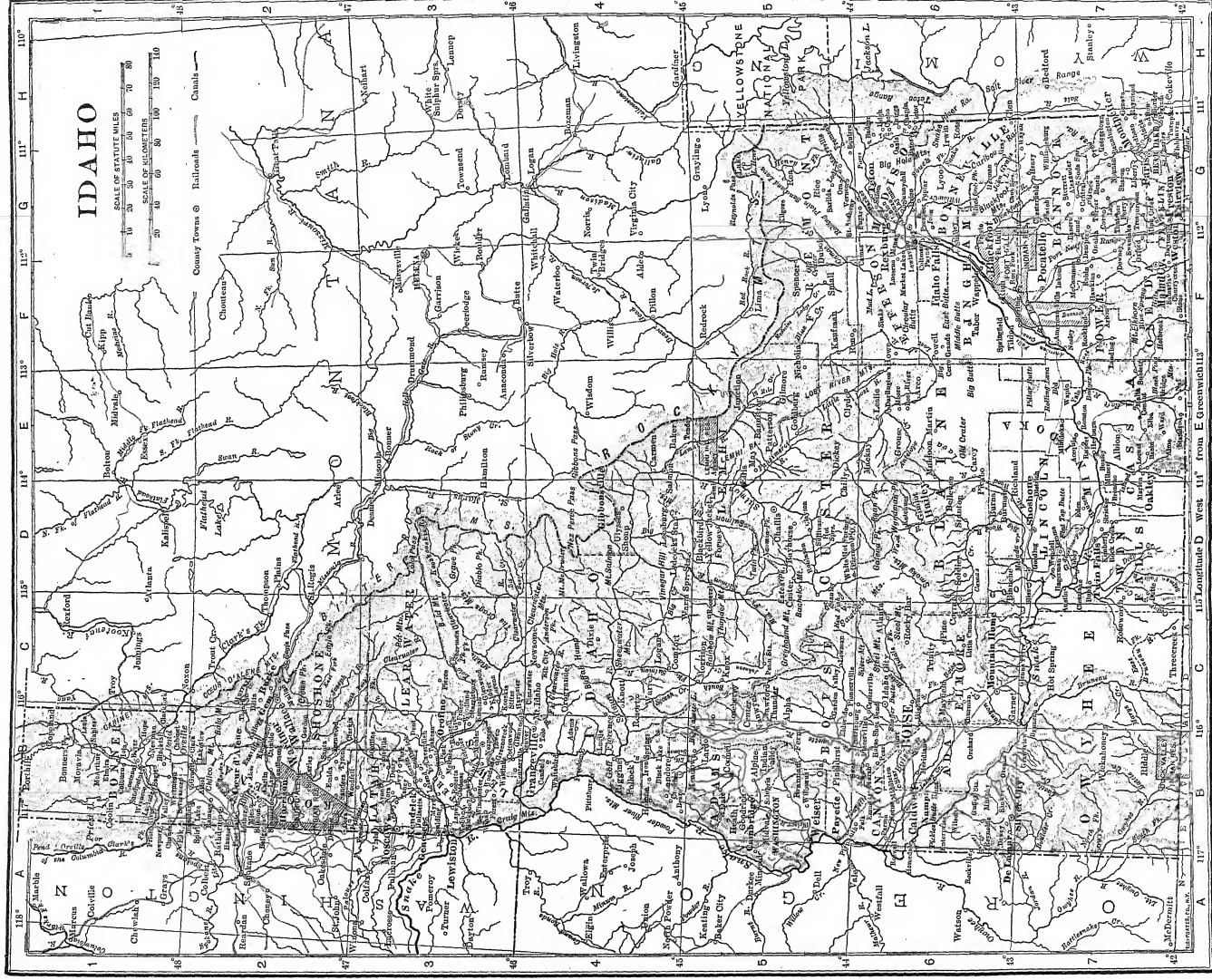
IDA. The princess, in Tennyson's poem of that name.

IDÆI DACTYLI (Lat, from Gk *Idæoi Daktuloi, Idæoi Daktuloi*). Like the Corybantes and the Curetes, the Idæi Dactyls were attendants upon Cybele (qv), and were originally connected with Mount Ida in Phrygia, whence they were transferred to Mount Ida in Crete, there they watched the infant Zeus. (See IDA). They are supernatural metal workers (their names meant Furnace, Smith, Anvil, etc). They seem to have derived the title "dactyls" from their ready fingers (compare *daktylos*, finger). Some regard them as idealized inhabitants of the region, which abounds in metals. Their number is given as 5, or 10, or sometimes even 100. In Greece they appear only at Olympia, where they seem to have been brought from Crete and were identified with Hercules and four brothers who first competed in the foot race.

IDA GROVE. A city and the county seat of Ida Co, Iowa, on the Maple River, 80 miles by rail east by south of Sioux City, on the Chicago and Northwestern Railroad (Map Iowa, B 2). It is the commercial centre of a fertile agricultural and stock-raising district and has grain elevators, a flour mill, two hospitals, a cigar factory, cement-block works, etc. A municipal heating and electric-lighting plant is in successful operation. Pop, 1900, 1967, 1910, 1874.

IDAHO, i'dā-hō (N. Amer Indian, gem of the mountains, or sunrise mountains). One of the Western States of the American Union, lying between lat 42° and 49° N and long 111° and 117° W. It is bounded on the north by British Columbia and Montana, on the east by Montana and Wyoming, on the south by Utah and Nevada, and on the west by Oregon and Washington. The extreme length from north to south along the west boundary is 483.5 miles. The width varies from about 45 miles in the north to 310 miles in the south. Its area is 84,000 square miles, including 534 square miles covered by lakes.

Topography. The surface of Idaho is greatly



diversified. Almost the entire State is in the drainage area of the Columbia River and is naturally divided into two sections by the Salmon River Mountains, which cross it from east to west at about 45° N. All rail communication between north and south Idaho is (1914) by means of lines running for a large part of the distance outside of this State. The elevation varies from 738 feet at Lewiston, where the deep cañon of the Snake leaves the State on the west border, to the snow-clad peaks of the Sawtooth Mountains, over 12,000 feet high. The general elevation is from 2000 to 7000 feet.

The mountain systems are numerous and irregular, including the Bitter Root Mountains and continental divide in the north, rising to an elevation seldom greater than 6500 feet, while to the south some of the peaks reach 11,000 feet, the Salmon River and Sawtooth ranges (central), containing the loftiest summits and noted for their rugged character and alpine scenery, and many minor ranges with distinct names.

The dominating physiographic feature of south Idaho, and the one most affecting its economic development, is the vast Snake River plain, stretching in a curved course, concave to the north, quite across the State, in a belt 50 to 75 miles wide and 350 miles along its medial line. The elevation gradually increases from 2114 feet at Weiser on the west to 4959 feet at St. Anthony on the east. It was built up principally of lava outpoured in great horizontal sheets and contemporaneously by lake and stream sedimentation and by æolian deposits. The Snake River (Lewis Fork) traverses it a part of the distance in box cañons, but in other portions builds up flood plains. The characteristic vegetation is an arborescent growth of sagebrush (*Artemisia tridentata*), which with the scarcity of water has given the plain a desert aspect. In reality the soil of great areas becomes wonderfully fertile upon irrigation, and it is this possibility which is the controlling factor in the settlement of south Idaho. A number of streams, as Big and Little Lost rivers, Birch and Camas creeks, reach the Snake River plain only to disappear.

Water power on a great scale constitutes one of the State's leading resources. Modern plants have been installed along the Snake at American Falls, the Minidoka Dam, Shoshone Falls, Swan Falls, Salmon Falls, the Thousand Springs, on the Malade at its mouth, and at Post Falls on the Spokane. In each case several thousand horse power are developed, but this is less than 3 per cent of the possible development throughout the State.

In the north there are numerous lakes, the largest of which are Cœur d'Alene, Pend Oreille, and Priest. In the center are the Payette lakes and in the southeast, on the Utah line, Bear Lake.

Climate. Idaho enjoys a milder climate than its latitude and altitude would indicate, through the effect of the mild conditions of the north Pacific on the one side and the protection of the great continental divide on the other. In the north the climate is ordinarily free from extremes of heat or cold, owing to the proximity of the Pacific Ocean and the occurrence of chinook winds. In south Idaho the climate is varied in the extreme. There are large areas where the snow seldom remains long and flowers bloom in January, while in the

near-by mountains a fire is needed almost every evening in the year. Normal annual precipitation ranges from 8 inches in part of the Snake River plain to 40 inches in the Bitter Root Mountains. The heavy precipitation of the mountains comes largely in the form of snow and is stored for summer use in irrigation of the plains and valleys below. The average highest temperature attained throughout the State in summer is 100.8° F., while the average lowest temperature in winter is -21.5° F. The mean annual temperature is 45.5° F.

Soils. North Idaho is noted for the fertility of the famous Palouse soil and that of the Nez Percé and Camas prairies, produced by disintegration of the lava outflows and by æolian action. These are famous for their production of macaroni wheat. The soils of the broad valleys of the Panhandle, black in color and rich in vegetable mold, are exceptionally fertile. The soils of south Idaho are exceptionally well supplied with all elements of fertility, except in regions of deficient rainfall which are low in humus and nitrogen.

Geology. Taking the State from north to south, in the Panhandle we have the Paleozoic sediments to the east, and some granites and schistose rock to the west in the neighborhood of Priest Lake. The sediments extend to about the north boundary of Latah and Clearwater counties, where they join the granite area to the east and the basalt to the west. The granite area extends south almost to the Snake River, but is complicated with large areas of Paleozoic sediments and Archean gneisses towards the Montana boundary. The basalt area extends south from Latah County into Washington and Oregon and thence up the Snake River almost to the eastern boundary and also south to the Nevada line. In the extreme southeastern corner there is a complex of sedimentary rock, mainly Carboniferous limestone. Glacial action is marked in many parts of central and north Idaho.

Flora and Fauna. See paragraphs on these respective topics under the article ROCKY MOUNTAINS.

Mining. The State has valuable mineral resources, many of which have not been fully developed. The center of the industry is the Cœur d'Alene lead-silver mining districts in Shoshone County. Lead, the mineral product of chief value, constitutes approximately 60 per cent of the State's total mineral production, which in 1914 was 345,000,000 pounds, valued at \$13,198,000, the State ranking second only to Missouri in the production of lead ores. Silver is second in importance among the mineral products, Idaho being outranked only by Nevada, Utah, and Montana. The mine yield of silver in 1914 amounted to 13,000,000 ounces, valued at more than \$7,115,000. Nearly all the silver is derived from lead ore and concentrate. A considerable amount of gold is produced from both placer and quartz mines, the product of 1914 being valued at \$1,115,000. The gold production from quartz mines has decreased, but gold output from dredging has increased, 35 per cent of the gold is produced in Boise County, which leads Owyhee and Lemhi counties in the order named. Idaho's importance as a producer of copper is increasing, the output in 1913 being 9,592,966 pounds, valued at \$1,486,910. The production fell off in 1914 to 5,500,000 pounds, of \$724,000 value. About 60 per cent of this

mineral comes from Shoshone County. Zinc production amounted in 1914 to 19,307 short tons. Other mineral products included clay products, coal (lignite), gem materials, lime, mica, phosphate rock, salt, sand, gravel, sand-lime brick, and stone. A non-metallic resource of great promise is phosphate, found mostly in the southeastern part of the State. The total mineral products in 1913 were valued at \$24,565,826. In 1914 the products of gold, silver, copper, lead, and zinc were valued at \$24,141,000. In that year there were 384 producing mines.

Forests Approximately one-third of Idaho is covered with timber. The total stand is estimated by the government at 129,000,000,000 feet board measure. The species of commercial value belong almost wholly to the coniferous group and occupy the more mountainous portions. In the northern part, however, in the valleys of some of the larger streams and on the flat, marshy lands adjacent to lakes, the black cottonwood (*Populus trichocarpa*) forms dense stands of merchantable timber of large size. This is the only hardwood growing in merchantable quantities.

The coniferous species, discussed in the order of their importance, are the western white pine (*Pinus monticola*) in the lower valleys and the northern slopes (to an elevation of 4500 feet) of all the northern counties, yellow pine (*Pinus ponderosa*), occupying the drier regions (at elevations below 5000 feet) supporting tree growth, and also the southern slopes of the white-pine belt, comprising nearly 40 per cent of the total stand of merchantable timber; western red cedar (*Thuja plicata*), coextensive with the white pine, but also found farther south on the eastern side of this State, Douglas fir (*Pseudotsuga taxifolia*), coextensive with the yellow pine but found also at higher elevations, western larch (*Larix occidentalis*), found associated with the white and yellow pine and Douglas fir, white fir (*Abies grandis*), scattered generally over the entire timbered area, Engelmann spruce (*Picea engelmannii*), confined to the northern slopes, lodgepole pine (*Pinus contorta-murrayana*), confined to the dry areas, western, or lowland, hemlock (*Tsuga heterophylla*), which grows to large size in the extreme north, lumber pine (*Pinus flexilis*); and western juniper (*Juniperus occidentalis*), on the north slopes of the hills in parts of the arid belt in the south.

Approximately 20,000,000 acres of Idaho land is included in national forests, and over 4,000,000 acres, owned mostly by large corporations, is under the protection of the North Idaho Forestry Association, which is composed of four smaller timber protective associations. In 1909, 4036 farms reported forest products to the value of \$1,280,512.

Agriculture By far the greater portion of the agricultural land is found in the plains on the banks of the Snake River. When irrigated, these prove to be wonderfully fertile. On the uplands heavy yields of wheat are secured without irrigation. On the alluvial bottoms and the bench lands of the small valleys in the Rocky Mountain portion of the State there are numerous areas of irrigated and dry farmed lands.

Of the total approximate land area of 53,346,560 acres in 1910, there were, in farms, 5,283,604 acres, in improved land in farms, 2,778,740 acres. The number of all farms in 1910 was 30,807 compared with 17,471 in 1900.

The average acres per farm decreased from 183.4 in 1900 to 171.5 in 1910. The value of farm property in 1910 was \$305,317,185, compared to \$67,271,202 in 1900. Another great increase was in the average value of property per farm, which was \$9911 in 1910 and but \$3850 in 1900. The average value of farm per acre in 1910 was \$41.63 and, in 1900, \$11.07. Of the State's entire land area in 1910 99 per cent was in farms. Only five counties had more than one-fifth of their land in farms in that year. One of the striking characteristics of the State's agriculture is the presence of great areas of semiarid lands utilized, if at all, only for grazing purposes, these districts being divided into large ranches, frequently exceeding 100,000 acres in extent.

In 1910, 27,619 farms were operated by owners and managers and 3188 by tenants. A great majority of these have been acquired by their owners or operators from the government or private corporations in the form of homesteads, Carey Act entries, desert-land entries or irrigated farms, the actual number of farms in the hands of tenants doubling in the decade 1900-10. In 1910 four-fifths of the farmers were native whites, the foreign-born white farmers immigrating principally from Germany, Sweden, England, Denmark, and Canada. The general character of the agricultural products in 1914 is indicated by the following table.

LEADING CROPS	Acreage	Prod bu	Value
Corn	19,000	589,000	\$424,000
Wheat	549,000	14,362,000	12,495,000
Oats	332,000	14,608,000	5,551,000
Barley	185,000	7,030,000	3,515,000
Rye	3,000	60,000	40,000
Potatoes	24,000	5,270,000	2,530,000
Hay	705,000	+1,868,000	13,636,000

*Tons

It will be noted that cereals, hay, and forage constitute the larger part of the crop production, the remainder consisting mostly of potatoes and vegetables, forest products, and fruits and nuts. In 1909 the product of sugar beets was valued at \$813,604. Orchard fruits were produced in the same year to the value of \$863,516. This total included apples, peaches, nectarines, pears, plums, prunes, cherries, and apricots. Strawberries, which are the most important small fruit, yielded 953,723 quarts, valued at \$92,904 in 1909, out of a total value for all small fruits of \$201,525. In 1912 the estimated acreage of orchards was 142,773, 40,000 of these being estimated to be fruit bearing. The estimated value of fruit products in 1912 was \$3,000,000, the product being shipped principally to Chicago and eastern markets and to Europe.

Stock Raising The estimated acreage of pasture land in Idaho is over 25,000,000, indicating that the cattle-raising industry is still of great importance, although short summers and depth of winter snows in the north and mountainous parts increase considerably the expense, confining the most productive stock-raising territory to the valleys along the Snake River. Estimates for Jan 1, 1914, place the number of dairy cows at 112,000 and other cattle at 354,000. The total value of all cattle for 1912 was \$22,403,000. The estimated number of horses in 1914 was 224,000, valued at \$22,464,000. The estimated number of mules in the

same year was 4000, valued at \$412,000. The estimated number of sheep in 1914 was 2,981,000, valued at \$12,520,000. In 1910 fowls of all kinds on farms numbered 1,053,876, valued at \$598,190. In 1909 the production of eggs amounted to 5,088,988 dozen, valued at \$1,213,724. In 1909, 20,861,072 gallons of milk and 3,542,135 pounds of butter, valued at \$982,397, were produced on farms. The total value of milk, creamery butter, and cheese was \$1,962,500.

Irrigation. The occurrence of widespread

yards, and has a reservoir capacity of 230,000 acre feet.

Manufactures. Since its admission as a State in 1890, the manufacturing industries of Idaho have more than kept pace with the growth of population. Industries, as a whole, showed a large percentage of increase during the five-year periods 1899-1904 and 1904-09. The accompanying table shows the most important facts in relation to the manufacturing industries in 1909, in comparison with 1904.

COMPARATIVE SUMMARY FOR 1909 AND 1904

THE STATE—ALL INDUSTRIES COMBINED AND SELECTED INDUSTRIES

INDUSTRY	Census	Number of establishments	PERSONS ENGAGED IN INDUSTRY		Capital	Wages	Cost of materials	Value of products	Value added by manufacture
			Total	Wage earners (average-number)					
All industries	1909	725	9,909	8,220	\$32,477	\$5,498	\$9,920	\$22,400	\$12,480
	1904	364	3,791	3,061	9,689	2,059	4,069	8,769	4,700
Brick and tile	1909	36	347	286	800	179	109	444	385
	1904	19	95	72	91	45	27	113	86
Butter, cheese, and condensed milk	1909	18	159	118	231	77	681	884	203
	1904	16	35	13	44	10	136	172	36
Cars and general shop construction and repairs by steam-railroad companies	1909	5	870	849	468	672	659	1,366	707
	1904	8	753	713	183	539	326	914	588
Flour-mill and gristmill products	1909	57	242	125	2,038	91	2,025	2,480	455
	1904	28	127	84	685	67	1,315	1,584	269
Liquors, malt	1909	11	111	74	1,231	65	234	698	464
	1904	14	86	61	459	54	74	303	229
Lumber and timber products	1909	256	5,904	5,212	17,872	382	3,345	10,689	7,344
	1904	107	1,670	1,449	3,516	3,876	906	3,142	2,286
Printing and publishing	1909	132	753	468	1,106	373	243	1,148	905
	1904	91	398	253	488	178	107	549	442
All other industries	1909	210	1,518	1,088	8,731	659	2,624	4,691	2,067
	1904	81	627	411	4,223	290	1,178	1,992	814

areas of level or gently sloping fertile land combined with deficient rainfall, notably in the Snake River plain and its tributary valleys, has given opportunity for many large irrigation projects, especially those built by private capital under the Carey Act (1894) and by the Federal government under the Reclamation Act (1902). At Milner is a rock-fill dam across the channel of the Snake, which is the diversion dam for the main canals of two of the largest Carey Act projects as yet constructed, the Twin Falls North Side and Twin Falls South Side, each irrigating over 200,000 acres. Another rock fill is the Reclamation Service Dam across the Snake at Minidoka. It diverts water for 119,000 acres, 49,000 of which are reached by pumping, with a maximum lift of 90 feet. Ten thousand electric horse power are generated at this dam, of which 7000 are used in summer to run the pumps. Near Twin Falls are two high-storage dams for Carey Act projects—the Salmon River Dam, a concrete structure 220 feet high, and the Oakley Dam, an earth dam with concrete core 143 feet high. In the Arrow Rock Dam, a storage dam built by the government across the Boise River, Idaho has the highest masonry dam in the world. It is 351 feet high, crest length 1060 feet, concrete required 580,000 cubic

The total number of wage earners in 1909 was 8220. Of these 8035 were men and 155 women. There were only 30 persons under 16 years of age employed. For the majority of the wage earners the prevailing hours of labor in 1909 were 60 a week, 24.1 per cent of the total being employed in establishments where they work less than that number of hours, and only 10 per cent being employed where they work longer. Boise, the capital and metropolis, is not important as a manufacturing centre. In 1909, 6.9 per cent of the establishments, 5 per cent of the wage earners, and 7.4 per cent of the value of products were found in that city.

Transportation. In recent years there has been considerable building of railroads, the mileage increasing from 1740 on Jan. 1, 1907, to 3577 in 1914, these figures including single and double tracks, yard tracks, and sidings. The Oregon Short Line passes through the southern part of the State and has the greatest length of line, 1336 miles. The Northern Pacific with 320 miles of track, the Great Northern with 80, and the Chicago, Milwaukee, and Puget Sound with 180, pass through the northern portion. The Oregon-Washington Railroad and Navigation Company has 135 miles of track, and the Spo-

kane International Railway Company 122 miles. A Public Utilities Commission has general charge of the regulation of railway rates. The development of mines within the great central part of the State has stimulated the construction of wagon roads and trails, but these are not adequate to the needs of the district.

Banks. There were, on June 4, 1913, 55 national banks, with a capital of \$3,495,000 and deposits aggregating \$29,231,000, 118 State banks, with deposits subject to check amounting to \$8,677,451, and savings banks with 962 depositors, with deposits subject to check aggregating \$47,710, and savings deposits amounting to \$183,495. In addition there were 11 loan and trust companies, with deposits subject to check amounting to \$1,533,218 and savings deposits amounting to \$276,046. Private banks numbered 6, with deposits of \$55,534.

Government. The present constitution was adopted by a convention held in 1889. Up to 1913 there were 22 amendments. An amendment to the constitution may be proposed in either branch of the Legislature, and, if agreed to by two-thirds of all the members of each House, voting separately, it shall be presented to the electors at the next general election. A convention for the revision or amendment of the constitution may be held upon recommendation to the electorate by vote of two-thirds of the members elected in each branch of the Legislature and majority vote of the electors at the next general election. The convention shall consist of a number of members not less than double the number of the most numerous branch of the Legislature.

Legislative.—The legislative power is vested in a Senate and House of Representatives. The Senate consisted in 1914 of 33 members and the House of 61 members. The Legislature has the power of increasing the number of Senators and Representatives. The House is composed of at least one member from each county, and it must never exceed three times the membership of the Senate. Both Senators and Representatives are elected for a term of two years. Sessions of the Legislature are held biennially, commencing on the first Monday after the first day of January. On Nov 5, 1912, the people approved an amendment providing for the initiative and referendum.

Executive.—The executive department consists of the Governor, Lieutenant Governor, Secretary of State, State Auditor, Attorney-General, and Superintendent of Public Instruction, each holding office for two years. The Governor, Lieutenant Governor, and Attorney-General must be 30 years of age at the time of their election. The Governor, Secretary of State, and Attorney-General constitute a board of pardons. The Governor has the usual veto power, and the Lieutenant Governor is President of the Senate. The Governor, Secretary of State, and Attorney-General constitute a board of State-prison commissioners, and the Governor, Superintendent of Public Instruction, Secretary of State, Attorney-General, and State Auditor constitute a State board of land commissioners which has direction, control, and disposition of the public lands under such regulations as may be prescribed by law.

Judiciary.—The judicial power is vested in a court for the trial of impeachments, a supreme court, district courts, probate courts, courts of justices of the peace, and such other

courts inferior to the supreme court as may be established by law for any incorporated city or town. The court for the trial of impeachments is the Senate. The supreme court consists of five justices, a majority of whom is necessary to make a quorum or pronounce a decision. The justices of the supreme court are elected by the electors at large. The term of office is six years. The State is divided into nine judicial districts, for each of which (except the third, fourth, and eighth) a judge, whose term of office is four years, is chosen by the qualified electors thereof. In the excepted districts there are two judges. District courts must be held in each county at least twice in each year. The Legislature has the power to reduce or increase the number of districts, district judges, and prosecuting attorneys. A prosecuting attorney is elected for each county by the qualified electors thereof and holds office for two years. The judges of the district courts are required on the first day of July in each year to report in writing to the justices of the supreme court such defects or omissions in the laws as then knowledge and experience may suggest, and the justices of the supreme court shall, on or before the first of December of each year, send a report in writing to the Governor, to be by him transmitted to the Legislature, on such defects and omissions in the constitutional laws as they may find to exist.

Suffrage and Elections.—Every male and female citizen of the United States, 21 years of age, who has actually resided in the State for six months and in the county 30 days, if registered as provided by law, is a qualified elector. In accordance with the provisions of a direct primary law enacted in 1909, all candidates for Congress and all elective State, district, and county officers are nominated at primary election held biennially. Each candidate for office, or some qualified voter in his behalf, is required to file a nomination paper at least 30 days and not more than 60 days prior to the primary election. Provision is made on the official ballot for voters to signify first or second choice of candidates for the respective offices. Candidates are required to file itemized statements of receipts and disbursements. Nominations may be made at conventions or primary meetings, they may also be made by petition. Provision is made for the registration of voters prior to elections, and crimes against the elective franchise, including bribery, illegal registration, etc., are severely punished. In 1909 the Legislature also passed a measure providing for elections under local-option law. On Nov 5, 1912, a constitutional amendment providing for the recall of all public officers except judicial officers was carried.

Local and Municipal Government.—Any county or incorporated city or town may make and enforce within its limits all such local police, sanitary, and other regulations as are not in conflict with its charter or with its general laws. No county, town, city, or other municipal corporation may become a stockholder in any joint-stock company, corporation, or association whatever, or raise money for, or make donation or loan its credit to, or in aid of, any such company or association. The county officers are county commissioners, the sheriff, county treasurer, probate judge, county superintendent of public instruction, county assessor, a coroner, and a surveyor. Cities and towns are permitted

to adopt a commission form of government. The Legislature in 1911 enacted a commission charter for cities of 2500 or more if they adopt the act at a special election. The charter provides for nomination by petition, for initiative, referendum, and recall. It may be abandoned after six years by vote at a special election called by a petition of 25 per cent of the voters.

Other Constitutional and Statutory Provisions—No charters of incorporation are granted, amended, or exchanged by special law except for such municipal, charitable, educational, penal, or reformatory corporations as may be under the control of the State. There is a bureau of immigration and labor statistics, which is under the charge of a commissioner of immigration, labor, and statistics, appointed by the Governor. Not more than eight hours' actual work constitutes a lawful day in all municipal undertakings. A county local option law was passed in 1909, and a strong search and seizure law was passed in 1911. In 1913, 21 of the 33 counties were "dry." There is an employers' liability law restricting the defenses of fellow servant and assumption of risk. The sanitary laws provide for the inspection of hotels and for sanitation in dairies and forbid the sale of adulterated, misbranded, or impure foods or drugs. In 1913 the Legislature enacted a law providing for a Public Utilities Commission, consisting of three members, and the law closely follows that of California and Washington as regards powers and duties. A State Tax Commission consisting of the same members as the Public Utilities Commission was also created. A Blue Sky Law was also passed.

Finance. The report of the State Treasurer for the biennial period ending Dec 1, 1914, showed a balance on hand at the beginning of the year of \$1,091,151. The receipts for 1913 amounted to \$2,143,122, and the disbursements to \$2,169,517, leaving a balance at the end of the fiscal year of \$165 85. The chief expenditures are for the expenses of State government and the maintenance of State institutions. The chief sources of income are from general tax levies, receipts from the Secretary of State's Department, interest on current funds, and receipts from sundry other departments. The amount of bonded indebtedness at the end of the fiscal year was \$2,421,450. A State board of equalization, consisting of the Governor, Secretary of State, Attorney-General, State Auditor, and State Treasurer, meets each year to equalize the value of property. The total value of all property for assessment purposes in the year 1912 was \$418,780,394. In 1911 the tax laws were revised.

Militia. The militia consists of a regiment of infantry and one detachment of sanitary troops. The number of enlisted men in 1913 was 790, and the officers numbered 50. The State designation is the National Guard of Idaho. The total number of males of militia age in 1910 was 86,384.

Population. The population has steadily increased from its earliest settlement, the figures by decades being as follows: 1870, 14,999; 1880, 32,610; 1890, 88,584; 1900, 161,772; 1910, 325,594. The estimated population on July 1, 1914, was 395,407. Of the total population, in 1910, 185,546 were males and 140,048 females. The population per square mile in 1910 was 3.9 per cent. The urban population was 69,898, and the rural population 255,696 in 1910. In 1910

the native white population numbered 203,599; the native whites of foreign or mixed parentage in 1910 numbered 75,195; and the foreign-born whites, 40,427. The Indian population of the State in 1910 numbered 3488, compared with 4226 in 1900. There were, in 1910, 859 Chinese and 1363 Japanese. The largest city and the capital is Boise. The population in 1910 was 17,358, compared with 5597 in 1900. The other cities with a population of 2500 and over in 1910 are Coeur d'Alene, 7291; Pocatello, 9110; Lewiston, 6043; Twin Falls, 5258 (incorporated in 1908); Idaho Falls, 4897; Nampa, 4205; Caldwell, 3543; Moscow, 3670; Wallace, 3000; Sandpoint, 2993 (incorporated in 1907); Weiser, 2600.

Indians. There were, in 1913, 4089 Indians. There were four reservations—Coeur d'Alene, Fort Hall, Lapwai, and Lemhi—with a total area of 482,130 acres. The tribes include the Coeur d'Alene, Kutenai, Pend d'Oreille, Spokane, Bannock, Shoshoni, and Nez Percé. Schools for these Indians are maintained at Coeur d'Alene, Kalispel, Kootenai, and Fort Hall. The total area of Indian lands in the State is 770,706 acres, of which 289,188 acres had been allotted in 1913, and 481,518 acres were unallotted. The total number of Indian children in the schools in 1913 was 663 out of a total of 970 of school age.

Education. In matters relating to education Idaho is progressive. The Legislature of 1911 passed a series of laws which practically revised the existing code, and these laws were further amended in 1912. A State board for the general supervision, government, and control of all educational institutions was created, this board constituting also the board of regents of the University of Idaho and exerting wider powers than the body which was in existence before its creation. The office of Commissioner of Education was established to propose and execute beneficial educational policies and to have general supervision over the educational institutions and public schools of the State. The State board is appointed by the Governor for a six-year term. The superintendent, the executive officer of the board, must be a graduate of an approved normal school, college, or university. Superintendents of public instruction are elected in each county biennially. The system of issuing certificates to teachers was revised and greatly improved. Provision was made for the holding of teachers' institutes annually under the direction of the county superintendent, and for a commission of summer normal schools—one at Pocatello, one at Boise, and one at either Coeur d'Alene or Sandpoint. Provision was also made for the establishment of rural high schools. The compulsory education law was amended and strengthened. The State board was given power to formulate rules and regulations for building schoolhouses, and important changes were made in the method of apportioning the school fund. A law forbids the employment of children under 14 during school hours and before 6 A. M. or after 9 P. M. Children between 14 and 16 are placed under the same limitations unless they have certain educational requirements.

The total school population (ages 6 to 20) according to the thirteenth census was, in 1910, 96,819. Of these, 66,779 were in attendance in that year. The enrollment in schools on June 30, 1912, was 84,791, and the average daily attendance was 66,359. There were 2710 teachers,

of whom 2021 were women and 689 men. The average monthly salary paid to women teachers was \$68.88 and to men teachers \$87.21. The total number of schoolhouses was 1287, and the estimated value of all school property was \$7,090,106. The total number of city and town high schools was 102, and rural high schools 15. The total expenditures in 1912 amounted to \$3,225,496. Of a total population in 1910 of 325,594, 3416 were illiterate, or a percentage of 1.5 per cent. Institutions of higher learning include the University of Idaho at Moscow, the Academy of Idaho at Pocatello, Lewiston Normal School at Lewiston, Albion Normal School at Albion, Industrial Training School at St. Anthony, the State School for Deaf and Blind at Gooding, and the College of Idaho at Caldwell.

Charities and Corrections. Institutions under State control include the Soldiers' Home at Boise, the State Penitentiary at Boise, the State Insane Asylum at Blackfoot, North Idaho Insane Asylum at Orofino, and the State Sanitarium at Nampa. In 1911 the Legislature passed a measure authorizing the establishment of a State sanitarium for feeble-minded and epileptics near Nampa, and created a prison commission to investigate conditions in the State Penitentiary.

Religion. In religion Idaho is, like Utah, strongly Mormon. Roman Catholics are the next strongest, and the Methodists, Presbyterians, and Baptists follow in the order named.

History. The first white explorers of Idaho were Lewis and Clark in the first decade of the nineteenth century. A mission is reported to have been established at Cœur d'Alene in 1842, but for many years after that the region was visited only by hunters and prospectors. It was organized as a Territory on March 3, 1863, but with an area more than three times as large as at present, since it included the whole of Montana and nearly all of Wyoming. In May, 1864, a part was set off to Montana, and in 1868 Wyoming was organized. The discovery of gold in 1882 at Cœur d'Alene in the northern part of the State was followed by a large immigration. In 1889 a new constitution was adopted, and the University of Idaho was established at Moscow. On July 3, 1890, Idaho was admitted to the Union. The presence of a large number of Mormons in the southern part of the State excited alarm and in 1883 led to hostile action on the part of the Legislature. A law depriving professed polygamists of the right to vote was sustained by the United States Supreme Court. In 1893 the heads of the Mormon church rejected polygamy as an essential element of their creed, the anti-Mormon restrictions were removed, and all single-wived Latter Day Saints were admitted to the ballot. From May to September, 1892, a miners' strike at Cœur d'Alene resulted in bloody conflicts between union and nonunion workers. Federal troops were sent to the scene of disturbance, and military law was proclaimed. The strike failed, but dissatisfaction persisted among the mine workers and in April, 1899, blazed out in renewed strikes and riots, necessitating again the use of United States troops. The bitter feeling engendered by the long conflict persisted and resulted in Dec. 30, 1905, in the assassination of ex-Governor Steunenberg. The chief officials of the Western Federation of Miners, William H. Moyer, president, William D. Haywood, and George W. Pettibone, accused

of complicity, were arrested in Denver and taken to Boise. An appeal was taken to the United States courts including the Supreme Court for a writ of habeas corpus on the ground that they had been unlawfully taken from the jurisdiction of the State of Colorado, but the writ was refused. The evidence against them consisted chiefly of a remarkable confession made by Harry Orchard, whose real name was Alfred E. Horsley, who testified to having taken part in a number of murders, assaults, and explosions in Colorado, Idaho, and other Western States while in the employ of the officials of the Western Federation of Miners. He testified further that he had placed the bomb which killed Governor Steunenberg after several previous attempts had failed. Haywood and Pettibone were acquitted, and the case against Moyer dropped. Orchard was placed on trial, pleaded guilty, and was sentenced to death. The State Board of Pardons commuted the sentence to imprisonment for life. The year 1910 was marked by the most disastrous forest fires in the history of the State. These fires began early in August and raged in the Cœur d'Alene region and around the towns of Wallace, Murray, and Mullan for several weeks. Wallace and several smaller towns were almost entirely destroyed, and many lives were lost. In 1912 constitutional amendments providing for the initiative, referendum, and recall were carried by large majorities. Statutes relating to the bonded indebtedness of the State and taxation were also submitted and carried. An amendment providing for increased membership of the Legislature was carried. The Republicans elected all representatives to Congress, and William E. Borah was reelected United States Senator on Jan. 14, 1913. Senator Heyburn died on Oct. 17, 1912, and the Governor appointed Kirtland I. Peiky to fill out the unexpired term until his successor could be elected. The Legislature of Jan. 24, 1913, elected James H. Brady, former Governor, to fill out the term, which expired on March 3, 1915. The State has, by the apportionment of 1910, two members in the House of Representatives, prior to that year it had but one.

In national elections Idaho was carried by the Democrats, or the Democrats and Populists in fusion, in 1892, 1896, 1900, and 1912, and by the Republicans in 1904 and 1908.

A comparison of the vote in the presidential elections of 1908 and 1912 follows:

	1908		1912
Taft, Rep.	52,606	Wilson, Dem.	33,921
Bryan, Dem.	36,080	Taft, Rep.	32,810
Chapin, Prohib.	1,740	Roosevelt, Prog.	25,530
Debs, Soc.	6,243		

In 1912 Haines, Republican, was elected Governor with 35,134 votes against Hawley, Democrat, with 33,992 votes. In the State elections of November, 1914, the Democrats succeeded in electing a Governor, but James H. Brady, Republican, was reelected to the Senate. The governors since its organization as a Territory have been as follows:

TERRITORIAL

William H. Wallace	1863-64
Caleb Lyon	1864-66
David W. Ballard	1866-70
Gilman Marston	{ resigned without acting
Thomas M. Bowen	
Thomas W. Bennett	1871-75
D. P. Thompson	1875-76
Mason Brayman	1876-80

John B. Neil	1880-83
John N. Irwin	1883
William M. Bunn	1884-85
Edward A. Stevenson	1885-89
George L. Shoup	1889-90

STATE

George L. Shoup	Republican	1890
Norman B. Wiley	"	1891-92
William J. McConnell	"	1893-97
Frank Steunenberg	Democrat-Populist	1897-1901
Frank W. Hunt	"	1901-03
John I. Morrison	"	1903-05
Frank R. Gooding	"	1905-07
James H. Brady	Republican	1907-11
James B. Hawley	Democrat	1911-13
John M. Haines	Republican	1913-15
Moses Alexander	Democrat	1915-

Bibliography Onderdonk, *Idaho, Facts and Statistics Concerning its Mining, Farming, and Industries* (San Francisco, 1885), Bancroft, *Washington, Idaho, and Montana* (ib, 1890), John Hailey, *History of Idaho* (Boise, 1910), Talkington, *Political History, State Constitution and School Laws of Idaho* (Lewiston, 1911), Rose, *Civil Government of Idaho* (Boise, 1912), McConnell, *Early History of Idaho* (Moscow, Idaho, 1913), United States Geological Survey, *Mineral Resources of the United States* (Washington, 1882 et seq.), id, *Bulletins* (ib, 1903 et seq.) Consult also *State Laws*, issued biennially.

IDAHO, UNIVERSITY OF A State educational institution, situated at Moscow, Idaho. It was founded in 1889, but was not opened for the reception of students until 1892. It is under the control of the State Board of Education and the Commissioner of Education and offers free instruction to students of both sexes. There are colleges of letters and sciences (including home economics, music, and forestry), engineering, agriculture, and law, and a summer session. It maintains agricultural experiment stations and has organized movable schools of agriculture throughout the State. In recent years agricultural extension, including cooperation with several counties of the State, has been developed, the headquarters being in the State House, Boise. Military drill is required of freshmen and sophomores in the university. The degrees of BA, BS, LLB, and MS in home economics, forestry, agriculture, and engineering, also MA and MS, are conferred. The attendance (1913-14) was 747. The faculty numbered about 80. The library contains about 35,000 volumes and 8000 pamphlets. The endowment consists of 286,000 acres of land, none of which can be sold for less than \$10 an acre. The buildings are valued at \$517,165, and the grounds at \$57,775. The income in 1913-14 was \$262,120. The president in 1914 was Melvin Amos Brannon, Ph D.

IDAHO FALLS A city and the county seat of Bonneville Co, Idaho, 30 miles northeast of Blackfoot, on Snake River, and on the Oregon Short Line (Map Idaho, F 6). It has excellent water power and is situated in a fertile irrigated agricultural region, for which it is the distributing centre. It has a sugar factory, and there is a Carnegie library here. The water works and electric-light plant are owned by the city. Pop, 1900, 1262, 1910, 4827.

IDAHO SPRINGS A city in Clear Creek Co, Colo., 37 miles by rail west of Denver, on the Colorado and Southern Railroad (Map Colorado, D 2). Picturesquely situated in the famous Clear Creek Cañon, at an elevation of 7543 feet, and having cold and hot soda springs,

it is one of the noted summer resorts of the State. In 1859 gold was first discovered in Colorado, at Jackson's Bar, within the present city limits. Since then the mineral production of the district has been enormous. The town has a number of concentrating mills, machine shops, lumber yards, etc., and is famed for its mining tunnels, notably the Newhouse Tunnel, one of the longest in the world. There are municipal water works and a Carnegie library. Pop, 1900, 2502, 1910, 2154.

IDALIA, i-dā'li-a, or **IDALIAN**, i-dā'li-an. An epithet of Aphrodite. See **VENUS**, **IDALIUM**. **IDALIUM** (Lat, from Gk. Ἰδαλίον, *Idalion*) A town in Cyprus, adjoining which was a forest sacred to Aphrodite, who was hence sometimes called *Idalia*. The site is the modern Daln.

IDDESLEIGH, idz'li, first EARL OF. See **NORTHCOTE**.

ID'DINGS, JOSEPH PAXSON (1857-) An American geologist, born in Baltimore, Md. He graduated at Sheffield Scientific School (Yale) in 1877, was a graduate student and assistant in mechanical drawing and surveying there until 1878, and continued his studies in geology and microscopic petrography at Columbia University and Heidelberg. From 1880 until 1892 he was in the service of the United States Geological Survey, to which he returned in 1895. In 1892-95 he was assistant professor, and from 1895 to 1908 professor, of petrology at the University of Chicago. In 1907 he became a member of the National Academy of Sciences. His government explorations were described in many reports and contributions to scientific journals. Among his more important writings are: *The Nature and Origin of Lathophyses and the Lamination of Acid Lavas* (1887), reprinted from the *American Journal of Science*; *On the Development of Crystallization in the Igneous Rocks of Washoe, Nev.* (1885), with Arnold Hague, *Rock Minerals* (1906, 2d ed, 1911), *Igneous Rocks* (2 vols, 1909-13).

IDE, id (Norw, Swed *id*, roach). A fish (*Leuciscus idus*), closely allied to the roach. It inhabits the lakes of the northern parts of Europe and ascends rivers in April and May to spawn. It is excellent for the table. A gold-colored variety, called orfe, is bred in Germany and is sold extensively for ornamental aquariums.

IDE, HENRY CLAY (1844-) An American public official, born at Barnet, Vt. He graduated from Dartmouth College in 1866. In 1876-78 he was State attorney of Vermont, and in 1882-85 member of the State Senate, and in 1884 president of the Republican State Convention. Appointed United States Commissioner to Samoa in 1891, he was for four years (1893-97) chief justice there under the joint appointment of Germany, England, and the United States. As a member of the Taft Commission, he helped to establish in 1900 civil government in the Philippine Islands, where he was subsequently Secretary of Finance and Justice (1901-04), Vice Governor (1904-05), acting Governor (1905-06), and Governor-General (1906). He was receiver for the Knickerbocker Trust Company, New York, in 1907-08 and from 1909 to 1913 was Minister to Spain. He published: *Code of Procedure in Civil Actions and Special Proceedings in the Philippine Islands* (1901); *The Land Registration Act* (1903), *The Internal Revenue of 1904 of the Philippine Islands*.

IDEA, i-dē'a (Lat. from Gk *idéa*, form, from *idéiv*, *idem*, to see, connected with Lat *videre*, to see, Skt *vid*, AS *uitan*, Eng *uit*, to know) The term "idea" has undergone a radical change of meaning in the history of psychology "Employed by Plato to express the real form of the intelligible world, in lofty contrast to the unreal images of the sensible, it was lowered by Descartes, who extended it to the objects of our consciousness in general" (Hamilton) In modern philosophy the word has a distinctly empirical flavor. Locke (q v) defines idea as "whatsoever is the object of the understanding when a man thinks," "that which the mind is applied about whilst thinking", and the English Associationist school (see ASSOCIATION OF IDEAS), failing to distinguish between existential "mental process" (q v) and logical "meaning" (q v), tended to regard the static, cognitive "idea" as the sole mental formation Current psychological usage, recognizing this distinction, emphasizes the fluid, changing character of ideas, and regards meaning as only incidentally a conscious matter, not inherent in the idea, but deriving from conscious context and determination According as an essential psychological difference between sensation and image (see IMAGINATION) is or is not admitted, ideas form a class of primary complexes made up of the latter element alone or of the two elements in conjunction, and the psychology of idea is the counterpart of the psychology of perception (q v) or is identical with it

Ideas may be formed, somewhat after the manner of the composite photograph, as the resultant of a large number of similar impressions. By the mutual inhibition of the elements of these impressions which are not identical, the idea loses definiteness of detail, while, by the repetition of the identical elements, it acquires an especial liability to associative reproduction Under the influence of abstractive determination (see ABSTRACTION) some, even of the frequently repeated elements, may be inhibited, and the ideational content may thus become less and less evidently "relevant" to its logical meaning Such an idea, which forms the characteristic complex in thought (q v), is called an "abstract" idea When, in the later stages of development, context and determination lapse from consciousness, and the idea becomes symbolic (eg, a word), it is named a "concept" Ideational masses of complex but vague contents, which require the operation of active attention to bring their constituents to separate recognition—such as our idea of the sentence that we are about to utter, or (on a still larger scale) our idea of self—are called "aggregate" ideas

Consult: Sully, *The Human Mind* (London, 1892), Ladd, *Psychology, Descriptive and Explanatory* (New York, 1894), James, *Principles of Psychology* (2 vols, 1b, 1890), Titchener, *Text-Book of Psychology* (1b, 1910), Wundt, *Grundsuge der physiologischen Psychologie* (Leipzig, 1911)

IDEALISM In philosophy, the theory that all material objects are only ideas in some mind, or the theory, developing from this one, that no reality is independent of consciousness Its ordinary antithesis is realism, or the theory that the reality of things is not dependent upon their relation to mind or consciousness In modern thought idealism found its classic expression first in George Berkeley's philosophy Locke had distinguished between the primary and the

secondary qualities of matter, the former belonging to matter in itself, and the latter being entirely subjective Berkeley argued that there is no more reason for considering Locke's primary qualities objective than his secondary qualities Hence he ranked all qualities of matter as subjective, and denied the existence of independent matter altogether, on the ground that it is an impossible abstraction Hume followed Berkeley in the denial of independent matter Kant reduced all matter to sensations actual or possible, in the subjective forms of space and time and ordered by the categories (See CATEGORY) But Kant still believed in things-in-themselves, i e, things not dependent in any way on our experience for their reality Thus, all experience for Kant was ideal, but experience does not exhaust reality Kant's immediate successors, Fichte, Schelling, and Hegel, each in his way continued Kant's view of the ideal character of experience, but declined to admit any things-in-themselves Fichte's and Hegel's idealisms were the starting points for various idealistic movements which have continued to the present day

Thus, we see that genetically modern idealism is of two fundamentally different types, the Berkeleyan and the post-Kantian, with more or less close affiliations between the two types The Berkeleyan idealism is pluralistic, in that the world of nature, the "objective world," is not considered as one but as many, each spirit having his own world in his own ideas Of these ideas some constitute his real world, others constitute his world of imaginary objects The post-Kantian idealism is monistic, there being for it one world which is contained within the "consciousness" or the "experience" of an all-inclusive spirit—the Absolute—of which finite spirits are in some sort parts The content of the Absolute's consciousness or experience, so far as it transcends finite consciousnesses or experiences, is the objective world of these finite spirits The Absolute is not the cause of the finite spirit but its complement, while Berkeley's God, the supreme spirit, has a separate and distinct equipment of ideas, and this world of ideas is the real world for other spirits only in the sense that it is the prototype of the real ideas in finite spirits God causes the finite spirits to have some ideas which correspond in the way of likeness to the contents of his own mind The Absolute is the ideal completion of all the implications of finite experiences—an ideal completion actually realized Thus, Berkeleyan idealism operates with the conception of causality as its highest category, while post-Kantian idealism operates with the categories of mutual implication, cause being only one such category and usually a subordinate one

Berkeleyan idealism has survived into post-Kantian times, but usually with modifications influenced by post-Kantian idealism In many cases, therefore, the idealists of the present day cannot be strictly classed as either Berkeleyan or post-Kantian, but they represent various degrees of synthesis or of syncretism based on these two distinct historical idealisms A detailed account of these various idealisms is impossible here For more details of system and for bibliography, see BERKELEY, HUME, KANT, FICHTE, SCHOPENHAUER, LOTZE, GREEN, T H, BOSANQUET, WARD, JAMES, ROYCE, MÜNSTERBERG, ECKEN, CAIRD, J and E, HOWISON.

See ROMANTICISM, REALISM AND NATURALISM

IDEAS, ASSOCIATION OF See ASSOCIATION OF IDEAS

IDELER, *id'ol-ler*, CHRISTIAN LUDWIG (1766-1846) A German astronomer and chronologist, born at Gross-Biese, near Peleberg, in Prussia. After holding various offices under the Prussian government he received a professorship at the University of Berlin in 1821, and in 1829 he was made a foreign member of the Institute of France. Ideler's most important works are *Handbuch der mathematischen und technischen Chronologie* (2 vols, 1825-26, 2d ed, 1833), which was the first work that presented a clear view of the reckoning of time among the ancients, and *Die Zeitrechnung der Chinesen* (1839), a supplement to the *Handbuch*. He also wrote, in conjunction with Nolte, handbooks of the French and English languages and literatures, which passed through numerous editions—His son, JULIUS LUDWIG IDELER (1809-42), was born in Berlin and was educated in the medical department of the University of Berlin. He wrote *Meteorologia Veterum Graecorum et Romanorum* (1832), *Die Sage von Schuss des Tell* (1836), *Hermaphrodite* (2 vols, 1841).

IDENTITY (ML *identitas*, sameness, from *identicus*, same, from Lat *idem*, same) A term used in philosophy in various meanings, often confused. In a puristic sense a thing is said to be identical when it is conceived of as an unchanging unit with no internal differences. Identity in this sense is not a relation, but rather the absence of relation. Again, identity is often used as manifesting itself in similarity, but when this is done, what is supposed to differentiate it from similarity is that the identical in similar things is considered as an unchanging core of undifferentiated quality, around which the differences which distinguish the similar things are grouped. Such a view is natural to those who regard universals as having an existence of their own and getting individuation by entanglement with other universals. Thus, it may be supposed that redness is an unchanging quality, then said to be identical in all reds. Mix in a bit of an unchanging white with the red and you get pink, mix in an unchanging blue and you get purple. According to this view, the universal is identical in the first sense of the term, and things are said to be identical when they partake in identical universals. All particulars are complexes of universals, particularity is composition of the identical universals as atomic elements. Since Hegel's time it has been more usual to consider such strict identity as an abstraction. From this point of view there is no identity without diversity. Identity is thus a relation which always involves at least two terms, and the duality of the terms, with whatever individuates them, is as essential as the relation which connects the terms. Identity is, in other words, an abstraction from the concrete fact of the existence of similar things. In so far as two things are like each other, they are identical in the respect in which they are alike. But this respect in which they are alike is not to be erected into a metaphysical entity, which has independent or logically prior existence, and which then becomes differentiated in the two particulars. The existence of things in the relation of similarity is the ultimate fact, and identity is what we

get when we ignore the differences between the things and dwell only on the similarity. Consult F H Bradley, *Principles of Logic* (London, 1883), G S Fullerton, *Sameness and Identity* (Philadelphia, 1890), F H Bradley, *Appearance and Reality* (2d ed, London, 1897), William James, *Principles of Psychology* (New York, 1899), Bernard Bosanquet, *Logic* (2 vols, 2d ed, Oxford, 1911), also various authorities referred to under LOGIC.

IDEOGRAPHY (from Gk *idea* *idea*, idea + *-graphia*, *-graphia*, a writing, from *graphein*, *graphein*, to write) The art of representing ideas by graphic signs, as may be seen in the hieroglyphics (qv) found on the monumental relics of Egypt.

IDES, *idz*. See under KALENDS

IDIOCY, *id'i-5-si* (from Gk *idiōtēs*, *idiōtēs*, uncouthness, from *idiōtēs*, *idiōtēs*, private citizen, from *idios*, *idios*, connected ultimately with Lat *suius*, Skt *sia*, own) A condition of arrest of development of the brain, and, in consequence, of the intellectual faculties, of the infant or child. If the nondevelopment is such that the child is capable of feeding himself and of appreciating enough of his surroundings to avoid injury, the condition is usually termed *imbecility*. If there is no such evidence of mental capacity, *idiocy* is the term usually employed. *Feeble-mindedness* occupies an intermediate position between normality and imbecility. The defect or disease of the brain which interferes with normal evolution may be congenital or acquired, the cerebral functions may be all more or less involved. Ribot and also Sollier maintain that the slow development of the cerebral faculties is due to want of attention, that spontaneous attention is caused by affective states brought into action by sensations, and that those young children are the most attentive whose nervous systems are most easily stimulated. Hence the faculty of attention is closely related to the activity of the sensations. The greater the power of attention, the more intelligent does the individual become. In idiocy, owing to the diminution or loss of the power of attention, the perceptions aroused by sensations are more or less indefinite, and the resultant idea likewise ill-defined. Sensations become more numerous as the organism develops, and the lack of ideas and recognitions becomes more noticeable. Frederick Peterson, whose translation of Sollier we quote, sounds a warning that there are other faculties of mind, such as will and memory, which are absolutely necessary to all subsequent mental activity, and adds that lack of the power of attention, while common in idiocy, cannot be taken in any way as distinguishing this condition of mind from other forms of mental impairment. Frequently somatic and especially cranial and facial characteristics are noticeable upon the birth of the idiot, though idiocy exists also when physical evidence is wanting. An idiot may not take the breast, may cry without motive and with different notes from normal children. Deafness or blindness may be congenital. The senses of smell and of taste may be undeveloped. The movements of the eyes may be irregular. The idiot may be slow in responding to the stimulus of touch, he may not laugh, thermic sensibility is diminished, a constant rhythmic, automatic motion may be present, he may not learn to walk, and all voluntary movements may be acquired late in youth and imperfectly. Organic sensations

are blunted, including hunger, thirst, desire for defecation or urination. Lack of the faculty of attention exists, owing to defective senses which convey feeble impressions to the brain, as well as to a lack of the affective state, the internal form of attention (reflection of Ribot) is absent or deficient in the idiot. He is practically incapable of preoccupation. His instincts are defective, whether of hunger or of self-preservation, while the instinct of imitation is very strong, and the sexual instinct is seldom normal, being exaggerated, impaired, absent, or perverted. Occasionally remarkable special aptitudes are seen in idiots in the direction of music, mathematics, mechanical arts, drawing, painting, memory for facts or dates, playing certain games, and a low order of wit or drollery. It is said that the court fools and jesters of ancient times were idiots of high grade or imbeciles, until others, seeing the emolument to be obtained, studied and practiced the art. Ribot says that Sikoiski is authority for the statement that the activity and attention of normal children are mainly developed through play. Idiots for the greater part manifest little tendency to play, clinging to the simplest games of infancy and preferring solitary pastimes. Others of higher grade prefer noisy, destructive sports, and traits of brutality, selfishness, and quarrelsomeness are apparent. Civility and politeness are rarely acquired. Destructiveness, evidenced in their play, may develop into a vicious satisfaction in inflicting injury, commission of arson, or of homicide, or of self-mutilation. Sentiments and sensation are rudimentary or absent, the absence of ideas of right and wrong, the varying respect for authority, the absence of religious feeling, and the absence of veracity being especially noticeable.

It has been said that idiot children sometimes show facial characteristics at birth. They are always ungainly, uncouth, or ugly in figure, face, attitudes, or movements. Very common among them are misshapen or unsymmetrical heads, dwarfishness, lack of proportion of the limbs, stooping and slovenly postures, deformities of the hands or feet, and awkward gait (Peterson). The expression of the face varies from apathy to constant laughing, leering, or scowling, the mental characteristics being evident also. There may be deformities of the iris, cornea, or the lids of the eyes, as well as malformation of the nose, ears, and chin. Microcephalus, hydrocephalus, and cretinism are found in some idiots. There are speech defects. Sollier finds two kinds of mutism in idiots, a motor and a sensory aphasia (qv). In the first the idiot cannot talk, though he understands, in the second he understands nothing which is said. Language is developed late in the idiots who talk. As stated, when infants, their notes are not normal, but meaningless, and monotonous cries take the place of the usual crowing of a baby. Speech disturbances are common, as regards both absence of words to express ideas, or imperfections of grammar, and also excessive and infinite loquacity. Reading is impossible in idiots who suffer from defects of the visual centres or the visual apparatus. The writing centre is the latest part of the linguistic cerebral equipment to be developed, together with its association tracts. They learn to reproduce letters, though never to write well, and they exhibit a tendency to write with the left hand and also to write from right to left. They ex-

cute drawing only by copying, without perspective, or produce scrawls of fantastic nature.

From preceding statements it has been gathered that the intelligence of the idiot varies from the normal in different degrees. He has fewer ideas than the imbecile. Imitation does not furnish ideas for him. It simply centres on mechanism, except in the idiots of higher grade, in whom the idea, assimilated by the intelligence, unfortunately is not retained, but lost. Sollier reminds us that memory is hereditary, organic, or acquired. (See MEMORY.) Hereditary memory exists often in idiots. Organic memory, or unconscious memory (as of walking and other associated movements), though sometimes completely absent in idiots, owing to defective nerve centres and lack of attention, is nevertheless better developed than either hereditary or acquired memory. Attention being an absolute requisite for acquired memory, idiots are rarely possessed of this power. Memory fixed by repetition of sensation, without emotional basis, is found in educable idiots, as, e.g., memory of the location of the dining room, of the bed, etc. The phenomenon of specialized memories, such as those for musical airs, or dates, e.g., is inexplicable. Association of ideas, occurring, as it does, by resemblance, contrast, and contiguity, hardly exists in idiots. They experience an association of sensations. Judgment and reason also are very faulty. Volitions do not exist in the lowest order of idiots. Voluntary control of the sphincters occurs in idiots who walk only after they have learned to do so. In higher idiots the will is manifested by more complex movements than actions accomplished for the satisfaction of natural needs and appetites, but even these complex movements may become secondarily automatic. Self-respect, to which one may appeal in an imbecile, is little developed in the idiot.

As to the psychological development of an idiot, points are reached in every case at which education ceases, and further mental progress is impossible. Peterson places the limits as follows in the inferior types: intellectual progress ceases at the age of six or seven, and sentiments and senses continue their development to 18 or 20, while in the superior grades the improvement of senses, sentiments, and intellect may all cease about puberty. Retrogression may occur, following the same law as dementia, to wit, enfeeblement of will, intelligence, sentiments, and sensations in this order. The causes of idiocy are various. Its elements are in many instances hereditary, i.e., a course of conduct in a parent which tends to degeneration, such as excessive alcoholic indulgence of any kind, will tend to induce arrested normal healthy development in offspring. Other causes are injuries received during childbirth, acute disease of the brain or its coverings in early infancy, or even while intrauterine. Injury to the brain may result in idiocy. Chronic disease of the brain coverings, tuberculosis, tumors within the brain, hydrocephalus, are other causes. A peculiar type of idiocy is due to maldevelopment of the thyroid gland. This is called cretinism, or myxedematous idiocy. The attempt to educate idiots commenced in the seventeenth century with an experiment of St. Vincent de Paul at the priory of St. Lazarus. His efforts to teach idiots, though continued for many years, were not successful. In 1799 the celebrated Itard took a wild boy found in the forests of Aveyron

and attempted to teach him, and although the success in this particular case was slight, he believed that he had discovered methods and facts which would be of use in other cases. These he communicated to his pupil, Dr Edouard Seguin, who in 1838 opened a school for idiots in the Hospital for Incurables in Paris. He met with success enough to have the idiots at the Bicêtre sent to the hospital to be instructed, and in the course of three years he received the approval of the French Academy. Dr Seguin adopted a system involving the theory that idioey was prolonged infancy. His practice, founded upon this, was to excite and continue the process of development. Of course a variable success attended the experiment. The art of effecting such development requires much knowledge, tact, and patience. Different kinds of idiots need different stimulants, physical and mental. Pure air, good nutritious food, exercise—in short, any treatment which is calculated to increase the bodily and mental functions—will improve the idiot. Wherever his interest can be awakened there will be a mental stimulus, and as the tendency of development is towards a normal standard, more or less improvement must follow. Seguin was succeeded by the celebrated Bournville at Fondation Vallée, attached to Bicêtre, who carried forward to a new point the systematic education of the idiot and was remarkably successful with imbeciles. Dr Seguin removed to New York City, where he established a school for idiots and feeble-minded children which was very successful. Other similar institutions exist in various parts of the country. Statistics are unreliable, as confusion is apt to be caused by the inclusion of epileptics and insane people with the feeble-minded and imbecile.

Consult Sollier, *Psychologie de l'idiot et de l'imbecile* (Paris, 1891), Preyer, *The Mind of the Child*, translated by H. W. Brown (New York, 1893), Ribot, *The Psychology of Attention* (Chicago, 1894), Peterson, "The Psychology of the Idiot," in *American Journal of Insanity* (Utica, New York, 1896), Barr, *Mental Defectives* (Philadelphia, 1904), Huey, *Backward and Feeble-Minded Children* (Baltimore, 1912), Goddard, *Feeble-Mindedness: Its Causes and Consequences* (New York, 1914), Tredgold, *Mental Deficiency (Amentia)* (ib., 1914). See also MENTAL DEFICIENCY, MENTAL PATHOLOGY.

IDIOCY, IN LAW. A total lack of reasoning powers, or of those intellectual faculties by which man is peculiarly distinguished. Its legal consequences, so far as contract and tort obligations as well as criminal responsibility are concerned, are the same as those of insanity (q.v.). The term is ordinarily limited to those who have had no understanding from birth, although some courts have declared that it is properly applicable to those who have become totally imbecile from sickness or other causes, as well as to congenital idiots. In case of one who has never possessed a glimmer of reason, the law presumes that he will never attain any. Hence, if a freehold tenant of land, the custody of his person and of his lands formerly vested in the lord of whom the fee was held. Because of the abuse of this power, Parliament transferred the wardship of idiots to the King, by Statute of 17 Edw II, c. 9. In this country the care of their persons and property is provided for by statute or safeguarded by constitutional provisions. It was laid down by ancient English

writers upon law that a man who is born blind, deaf, and dumb can have no understanding and hence cannot make a valid contract, gift, or grant. This doctrine had its origin in a misconception of certain texts of the civil law, which declared that one who was deaf or dumb could not be a party to a *stipulatio*, i.e., a contract which was entered into by an oral question and answer, in certain formal words. It is quite clear that a dumb person could not be a party to this formal contract, for he could not ask the question nor speak the response. Deafness also incapacitated one for such a contract, by preventing his hearing the question or the answer. But the civil law never countenanced the presumption that a deaf and dumb person was mentally incapable of entering into a consensual contract. In modern English law the presumption is only *prima facie*, and may be repelled by evidence, that the particular person whose competency is brought into question does possess sufficient intelligence to rank as one of sound mind. Consult the *Commentaries* of Blackstone and Kent, Holmes, *Misunderstandings of the Civil Law*, 6 Am Law Rev 37, and the authorities referred to under MEDICAL JURISPRUDENCE.

IDIOM (Ger *Idiom*, Fr *idiome*, Lat *idioma*, Gk *ἰδιῶμα*, *idiōma*, peculiarity, from *ἰδιόσθαι*, *idiousthai*, to make one's own). A term used to denote a phrase or form of words approved by the general usage of a language and sometimes admitting neither grammatical nor logical analysis. In a broader sense it denotes the genius or peculiar cast of a language, hence it is often applied to a peculiar form or variation of a language, a dialect.

IDIOM, NEUTRAL See UNIVERSAL LANGUAGE.

IDIOPATHY (from Gk *ἰδιοπάθεια*, *idiopatheia*, peculiar feeling, from *ἰδιόπαθος*, *idiopatēs*, affected peculiarly, from *ἴδιος*, *idios*, peculiar + *πάθος*, *pathos*, feeling). A term in pathology, denoting the quality of being idiopathic. An idiopathic disease is a primary condition, not dependent on another disease or injury. Idiopathic epilepsy, e.g., is so called when it is not secondary to or dependent upon any obvious cause, such as injury to the head or reflex influences. (See EPILEPSY.) In the sense of idiosyncrasy (q.v.) or peculiar susceptibility, the word is obsolete.

IDIOSYNCRASY (Gk *ἰδιοσυγκρασία*, *idiosynkrasia*, peculiar temperament, from *ἴδιος*, *idios*, peculiar + *σύνκρασις*, *synkhrasis*, mixture, from *συνκεραινύναι*, *synkerannynai*, to mix together, from *σύν*, *syn*, together + *κεραινύναι*, *kerannynai*, to mix, from *κρᾶσις*, *khrasis*, mixture). An individual trait or constitutional peculiarity. Thus, there are persons who have a great dislike to particular kinds of food, smells, sounds, etc., which to most persons are agreeable, and, on the other hand, a desire is sometimes manifested for things generally disliked. In particular individuals an eruption of the skin will be caused by eating strawberries, or fainting by the smell of a rose, when the person is unaware of the cause. Idiosyncrasies also occur in consequence of which certain medicines become inoperative, or certain poisons harmless. On the other hand, many individuals exhibit an idiosyncrasy to certain drugs, so that minute doses of them will produce profound or even alarming effects. Idiosyncrasies are either permanent or temporary, sometimes arising from mere morbid conditions and disappearing along

with them. The term is also employed to denote *mental* as well as *physical* peculiarities, which are often signs of insanity, such as baseless antipathies to certain persons, bizarre arrangement of articles in one's room, permanent dread of passing certain objects, etc.

IDIOT. See IDIOCY, MENTAL DEFICIENCY.

IDITAROD, e-dé'ta-rót'. An Alaskan mining town, the centre of the gold-mining industries of the upper Innoko and Iditarod valleys and of adjacent regions (Map Alaska, G 4). It has a wireless station and is connected by a winter trail of 512 miles with Seward, via Susitna (pop., 233) and Knik (pop., 118).

IDLEER, THE. The title of a series of papers by Dr. Johnson, published in Payne's *Universal Chronicle* (1758-60).

IDOCRASE, i'dô-krās. See VESUVIANITE.

IDOL (OF *idole*, Lat. *idolum*, from Gk. εἶδω-λον, *eiddôlon*, image, from εἰδέναι, *eidenai*, Skt. *vid*, to know, Lat. *videre*, to see). An image intended to represent a deity and to be adored as such. The act of such adoration is idolatry. Through theological usage the term "idolatry" has come to mean in a general sense any worship or obeisance paid to any other than the Supreme Being as conceived by Judaism, Christianity, or Islam. Confining ourselves to the more restricted usage, the worship of idols appears to be a phase of religious evolution that is natural to man at a certain stage of culture. It arises from the desire to furnish some tangible evidence of the presence of the powers upon whom man feels himself to be dependent. In this sense idolatry is to be distinguished from the attribution of divine force to a sacred stone, river, or other object. The sanctity is inherent, for one reason or the other, in such objects themselves, whereas the sanctity of an idol is due to its being a symbol. It becomes evident, therefore, that while the direct worship of objects is a link in leading to a symbolical image worship, the latter belongs to a phase of religious thought transcending the more primitive manifestations of the religious instinct. This thesis finds an illustration in the religious history of the Semites as well as in that of the Greeks and Romans. The localization of nature deities, such as the sun, moon, and certain planets, led in the case of the Babylonians and Egyptians to representation of the gods of a more or less fanciful character, and the development of the art instinct acts as a powerful factor in promoting and maintaining the worship of these gods under the form of images of men or animals, or of a combination of the two. The influence exerted by Babylonian and Egyptian culture led the nations of Palestine—notably the Phœnicians—to replace poles and stones by symbolical representations of the gods, and the Hebrews likewise after they had advanced to the agricultural stage fell a prey to these same influences until, through the reaction brought about by the teachings of the prophets, an emphatic protest against all manner of idolatry is embodied in the religious system and cult of post-exilic Judaism. The rise of Christianity helped to spread the doctrine further, though the Christian veneration of sacred images (see IMAGE WORSHIP) was by some confounded with idolatry. Islam struck at the root of the matter by forbidding the making of any representation of any living thing, whether intended to be worshipped or not (Cf. Ex. xx 4). To give life was felt to be the exclusive prerogative of God,

and to attempt to reproduce even the external form of a living thing was regarded as impiety. As a consequence, wherever Islam secured a foothold idolatry was doomed. Zoroastrianism at least did not encourage idolatry, but it is noticeable that in the extreme East—India, China, and Japan—idolatry was not only reconciled with the remarkable development of religious thought that took place in those regions, but its hold seemed to grow stronger with each new phase in this evolution.

IDOLATRY. See IDOL.

IDOMENEUS, i-dôm'é-nūs (Lat. from Gk. Ἰδομενεύς). The grandson of Minos and son of Deucalion of Cete. As ruler of Cnosus and Cete, he led 80 ships to Troy. In the *Iliad* he is described as one of the mightiest of the heroes, and in the battle at the ships he plays a leading part. The early history makes him return to his home in safety and receive there in due time an honorable burial. In later writers he was represented as vowing during a storm to sacrifice to Poseidon the first living thing that should meet him on a safe return to Cete. The victim was his son. When presently a plague broke out in the island, his subjects drove him forth. He wandered to Calabria in Italy, where he built a temple to Athena, and later from Italy to Asia Minor, where he established a shrine of Apollo near Colophon. Here he died and was buried.

IDRAC, é'drak', ANTOINE (1849-85). A French sculptor, born at Toulouse. He studied under Guillaume and Falguère at the Beaux-Arts. He first exhibited at the Salon in 1877 and won a first-class medal in 1879. The Luxembourg has his "Mercury Discovering the Caduceus" and "Salambo." The latter reveals remarkable ability in representing the suppleness of the nude, the mastery of which was the chief characteristic of his art. "Salambo" won him the cross of the Legion of Honor.

IDRIA, é'dre-a. An important mining town in the Austrian Crownland of Carniola, situated in a deep caldron-shaped valley on the Idria, 25 miles west of Laibach (Map Austria-Hungary, D 3). Idria is famous for its quicksilver mines, ranking only second to the Almaden mines of Spain. They were discovered in 1497 and have been operated by the state since 1580, employing altogether about 1250 persons and yielding over 500 tons of quicksilver annually. It has also a trade school for bobbin workers, a bobbin factory, and electric works. Pop. (district), 1910, 16,376.

IDRISI, id-ré'sé. See ENRISI.

IDRISITES, id'ri-sits. A dynasty of Arab rulers in the northwest of Africa. The founder of the line was Idris of the race of Ali, who in 786 became ruler over several native Berber tribes. His capital was Walili, on the site of the Roman city Volubilis. His son Idris II founded Fez in 808 and greatly increased his possessions by conquest, but on his death the kingdom was divided among his sons, and, thus weakened, it fell an easy prey to the power of the Fatimites, who took possession of Fez in 921. One of the Idrisites, Al Hasan, maintained himself in a part of Fez until 926. Consult Mackenzie, *The Khalifate of the West* (London, 1911).

ID'UMÆ'A. See EDOM.

IDUN, é'doon (Icel. *Þunn*, perhaps from *ǣ*, energy, cf. Eng. *eddy*, or from prefix *ǣ*, meaning 'again'). The name of a goddess of Scandinavian mythology. She was the daughter of the

dwarf Ivald, but, being received among the Æsir, she became the wife of Bragi. Idun possessed a box of apples, by the use of which the gods preserved their perpetual youth. She was carried off by the giant Thiazi, with the assistance of Loki. But the gods, beginning to grow old and gray without their apples, sent Loki after her, and, changing himself into a falcon and Idun into a nut, he returned with her to Asgard. In this myth Idun represents spring, and Thiazi winter. According to Sophus Bugge, the main story may be closely connected with the Greek myth of the golden apples of the Hesperides in an Irish version. The introduction of edible apples at a time when this fruit was unknown in the North seems to imply a foreign source.

ID'YA. A poetical name of Britannia.

IDYL, or **IDYLL** (from Fr *idylle*, Lat *idyllium*, from Gk *εἰδύλλιον*, *eidyllion*, short poem, from *eidos*, *eidos*, form, scene). A term generally used to designate a species of poems of moderate length representing scenes of pastoral or out-of-door life. It is, however, an error to suppose that the idyl is exclusively pastoral, certainly there is no warrant for such a notion in either ancient or modern usage. Of the 31 idyls attributed to Theocritus (q.v.), only 10 are bucolic.

IDYLLS OF THE KING. Twelve poems by Tennyson, published between 1842 and 1885, based on the Arthurian romances. The titles are "The Coming of Arthur," "Gareth and Lynette," "The Marriage of Geraint," "Geraint and Enid," "Balin and Balan," "Merlin and Vivien," "Lancelot and Elaine," "The Holy Grail," "Pelleas and Ettarre," "The Last Tournament," "Guinevere," "The Passing of Arthur."

IDZU, *ē'dzō*. One of the 15 provinces of Japan which make up the Tōkaidō, or East Sea Circuit, and through which the highway called the Tōkaidō runs. It is a mountainous peninsula, with numerous bays and promontories, 32 miles long and 16 wide, lying between the bays of Sagami on the east and Suruga on the west. Geologically and topographically it forms part of the volcanic range of mountains with which the name Hakone is associated. Its most important river is the Kanōgawa, which flows north into Suruga Bay, and its highest peak is Amagisan, with a height of about 4800 feet. Its chief towns are Mishima, on the Tōkaidō, and the small but beautiful port of Shimoda, on the southeast coast. The rearing of silkworms and the reeling of silk form the principal industry of the peninsula. It abounds in hot springs and watering places, the chief of which is Atami, about 45 miles from Yokohama. To Idzu-Shichito belong, both geologically and politically, the "Seven Volcanic Islands," of which Oshima, or Vries Island, 38 miles from the mainland, is the chief, and farther south Hachijō-shima, long used as a place of banishment. Consult Rein, *Japan* (London, 1884), and Satow and Hawes, *Handbook for Travellers in Central and Northern Japan* (Yokohama, 1881).

IE'ENE, *i-ēr'nē*. An ancient Greek name for Ireland.

IE'SI. See **JESI**.

IF, *ēf*. A rocky island about 2 miles west of Marseilles, with a castle, the Château d'If, built in 1529, and later used as a state prison. In it Mirabeau, Philippe Egalité, and others were confined. The castle is most widely known through Dumas's *Count of Monte Cristo*.

IFFLAND, *ēf'lant*, AUGUST WILHELM (1759-

1814). A German actor and dramatist. He was born at Hanover and was intended for the Church, but before he was 19 the stage had become his choice. He went to Gotha, where he studied under Gottei, Beck, Beil, and Ekhof, and thence in 1779 to Mannheim, where he first became famous by his rôle of Franz Moor in Schiller's *Rauber*. Differences with his manager induced Iffland in 1796 to accept the post of director in the Berlin National Theatre. Fifteen years afterward he was made superintendent of all the royal theatres, and under his management the Berlin stage reached its highest point. But he was not merely an able manager. As an actor, he showed himself artistic, painstaking, and minute, strong in comedy of everyday life. Voice and figure unfitted him for tragedy. For the stage he translated and wrote himself, for the most part, plays of over-great sentiment and too strongly urged didactic purpose. Iffland was really no poet, but he so well knew how to depict on the stage the everyday troubles of the ordinary mortal that his plays were very popular. In them, however, he displayed some literary talent and great practical knowledge of the stage. *Verbrecher aus Ehrsucht*, *Die Jäger*, *Dienstpflicht*, *Der Spieler*, and *Die Mündel* kept the stage for a century. Iffland's dramatic criticism is to be found in his *Almanach für Theater und Theaterfreunde* (1806-11) and *Theorie der Schauspielkunst* (1815). His complete works appeared in 24 volumes (1843 et seq.). Consult Duncker, *Iffland in seinen Schriften* (Berlin, 1859), the autobiography, *Meine theatralische Laufbahn*, edited by Holstein (Heilbronn, 1886), Genée, *Ifflands Berliner Theaterleitung* (Berlin, 1896), A. O. Stuchler, *Das Ifflandsche Ruhstück* (Hamburg, 1898), Kail Lampe, *Studien über Iffland als Dramatiker* (Celle, 1899).

IFNI, *ēf'nē*. A seaport town of Africa, situated on the west coast of Morocco, opposite the Canary Islands (Map Africa, C 2). It was ceded by Morocco to Spain in 1883. Pop., about 6000.

IFUGAO, *i'fōō-gou'*. A Malay tribe which occupies the subprovince of Ifugao in northern Luzon. They are a strong, well-built people, of medium height, with dark brown skins and straight hair. The ordinary clothing of both sexes is very scanty, but this lack is in part made up for by elaborate tattooing and extensive use of ear, neck, arm, and leg ornaments. The Ifugao live in settlements the buildings of which are raised several feet above the ground and are carefully constructed of boards. These villages are always near the rice fields in order that the people may keep watch on their crops. The rugged nature of the country has compelled the people to cultivate the mountain sides, and there they have developed a system of terraced fields which excels that of any other primitive tribe. The stone retaining walls are often 40 feet high, and so steep are the mountain sides that the level plots gained by building such walls and filling in behind them are often not more than 20 feet wide. Water is brought for long distances by means of flumes and ditches and then is skillfully led from plot to plot. In addition to being wonderful agriculturists, the Ifugao are expert workers in iron and steel and are also skillful wood carvers. When not held in check, the men are still inveterate head hunters, and it is no uncommon thing to find the skulls of enemies placed on a shelf beside

the entrance to a dwelling. The people known as Quangan belong to this tribe. See PHILIPPINE ISLANDS.

IGBARA, ēg'ba-ra, or **IGBIRA**, ēg'bī-ra. A negro people of the Sudan living at Nupé on the right bank of the Niger and southward to Yoruba. They are said to be industrious and commercial. Their language belongs to the same linguistic group with Nupé, Ewe, and Tshi. Half a century ago the Kingdom of Nupe was subdued by the Hamitic Fulahs, and the Igaras, together with other kindred tribes, were brought under Moslem influence, though many are still pagan. The ruins of Fende, or Panda, the capital of this once powerful dominion, are still to be seen. They are governed by a Fulah Emir, but are within the British Protectorate. See FULAH.

IGERNA, i-gē'na, **IGERNE**, i-gēr'n', **IGRAINE**, i-grān', or **YGNERNE**, ig-nēr'n'. In the Arthurian romance, the wife of Gollois, Duke of Cornwall. She was loved by Uther, King of Britain, and by him became the mother of Arthur.

IGLAU, ē'glou. An ancient town of the Austrian Crownland of Moravia, situated on the Iglawa and on the Bohemian frontier, 56 miles northwest of Brunn (Map: Austria-Hungary, D 2). It has a fine market place, a number of interesting churches (including St John's, dating from the eighth century), a Rathaus, barracks (formerly a Dominican monastery), and a cloth hall. In the Middle Ages Iglau was an important silver-mining centre, but since the Thirty Years' War mining has been practically extinct, and the manufacturing of cloth and woolen goods is now the foremost industry. There are numerous weaving, spinning, and dyeing establishments, and a state cigar factory employing over 2500 hands, also manufactures of plush, lace, shoes, leather, ether, furniture, pottery, and sugar. There is also a considerable trade in agricultural products, cloths, and lumber. Pop (district), 1900, 36,930, 1910, 38,369, chiefly German Catholics and including over 4000 Czechs. Iglau is a town of great antiquity, its silver mines having been worked as early as the eighth century. By the Treaty of Iglau, in 1436, a settlement was effected between the Hussites and Sigismund, who was acknowledged King of Bohemia. The town suffered heavily from a fire in 1523 and was twice captured by the Swedes during the Thirty Years' War.

IGLESIAS, ē-gla'se-as, **JOSÉ MARÍA** (1823-91). A Mexican statesman and author. He was born in the city of Mexico, studied law in the university there, and later became professor of jurisprudence in that institution. He early entered politics and speedily attracted attention by his natural ability. Political preferment rewarded his loyalty to the government, and in 1857 he became Secretary of Justice and a little later Secretary of the Treasury. In 1863 he was again Secretary of Justice, and from 1864 to 1867 he held the two portfolios of Justice and the Treasury. In 1868 he was a member of the General Congress, and the same year was appointed Secretary of the Interior by Juárez, to whose fluctuating fortunes he had clung with unswerving fidelity. In 1873 he became president of the Supreme Court and by virtue of that office assumed the presidency of the Republic when Lerdo de Tejada was overthrown in 1876, but was soon compelled to give up the position to Díaz. After 1878 he applied

himself to journalism and published several works on Mexican history, among them *Revistas historicas sobre la intervención francesa en México* (Mexico, 1867-69).

IGLESIAS, MIGUEL (1822-1901). A Peruvian soldier, born in Cajamarca. He came into prominence just before the Chilean-Peruvian War, serving as Minister of War in 1880. In 1881 he did valiant service in the defense of Lima against the Chileans and was captured, but afterward escaped. He held the view that it was necessary to accede to Chile's demand for alienation of territory in order to secure the withdrawal of the invading army. At the suggestion of Chile in 1883 he assumed the presidency, formed a cabinet, and entered into the Treaty of Ancón on October 20. (See PERU.) The many Peruvians who did not approve the treaty opposed General Iglesias under the leadership of General Cáceres. The opposition secured such success that, in 1885, an agreement was entered into, by which both Iglesias and Cáceres resigned from power and a council of ministers was formed to govern till an election was held. Upon the election of Cáceres to the presidency in 1886 Iglesias went into exile.

IGLESIAS, PABLO (1850-). A Spanish politician and Socialist leader, born in the Province of Coruña. He learned the painter's trade and in 1868 became affiliated with the Internationale des Travailleurs. In 1871 he was a member of the federal council of the International of Spain and worked on the Socialist paper, *La Emancipación*. He was one of the organizers of the Partido Socialista Obrero in 1878 and later served as president of the Asociación del Arte de Imprimir and of the Federación Tipográfica. After 1885, when he became editor of *El Socialista*, the official organ of the Socialist party, he was most active as an agitator. In 1910 he was elected one of the representatives of Madrid to the Cortes, and in 1913 was president of the Unión General de Trabajadores (Labor Union).

IGLESIAS DE LA CASA, dā la ka'sa, **JOSÉ** (1748-91). A Spanish poet, born at Salamanca. His earliest writings were satires in the form of epigrams and *letrillas* directed against contemporary society. After entering the Church he wrote works of a graver nature, and later his verses were merely rhymed theological discussions. His style has much clearness and animation, but lacks originality. The first edition of his works is that of Salamanca (1798). The idyls and romances included in this edition are not so well known as his poetry and are of less value. His name is included in the *Catálogo de autoridades de la lengua*, published by the Academia Española. Consult *Biblioteca de autores españoles*, vol. LXI (Madrid, 1869), and Iglesias, "Poesías inéditas," in *Revue hispanique*, vol. II (Paris, 1895).

IGLOO, ig'loo. See SEWARD PENINSULA.

IGLOO, or **IGLU**. See ESKIMO.

IGNACIO, ēg-na'thē-ō, **JOSÉ DE JESU MARÍA** (1721-80). A German Jesuit, whose secular name was Herman Loessing. He was born in Paderborn and began his clerical career as professor of rhetoric and philosophy in the College of Old Mexico. While there he became interested in the antiquities of the country and spent about 10 years in collecting them. Returning home with his spoils, he became librarian to the Archbishop of Cologne (1768) and published *De Arte Hieroglyphum Mearcanorum* (1774), His-

toria Novæ Hispaniæ (1777), *Reisen in Neu-Spanien* (1778), *Historia Regni Aztecorum* (1780), and *Cosmographia* (1780). He became blind before his death, and after it his notes were incorporated into two works by Chastelard.

IGNATIEFF, ig-na'tyéf, NIKOLAI PAVLOVITCH, COUNT (1832-1908). A Russian general and diplomat, born in St Petersburg, Jan 29, 1832. He was the son of a favorite officer of the Emperor Nicholas and was commissioned in the Guards in 1849, he served in the Crimean War, and was made a colonel in 1856 and a major general in 1858. In the latter year he was made diplomatic attaché to General Muravieff, Governor of east Siberia, and in this capacity negotiated with China the Treaty of Aigun (May 28, 1858), by which Russia came into possession of the region of the Amur. He was subsequently sent on a special mission to Khiva and Bokhara, and as Plenipotentiary to Peking in 1860. He was made adjutant general of the Czar in 1863 and was placed at the head of the Asiatic department of the Ministry of Foreign Affairs. In the following year he was sent to Constantinople to represent the Czar at the court of the Sultan, and he remained in this important post until the outbreak of the Russo-Turkish War in 1877, which he did much to bring about. He was an active agent in the events of this exciting and critical period, encouraging the restlessness of the Christian peoples of the Balkans, while endeavoring to maintain the Russian influence over the Sultan. In the pursuit of his ends Ignatieff did not hesitate to resort to duplicity and the basest kind of intrigue and succeeded in gaining the sobriquet of *Liar Pasha*. Through such means he was quite successful in maintaining the Russian influence during the life of Abdul Aziz, but after the latter's violent death and the deposition of Amurath V (1876), the anti-Russian influence became predominant with Abdul Hamid, and events moved rapidly towards war. After the conference at Constantinople during the winter of 1876-77, Ignatieff hastened to Berlin, Vienna, and London on diplomatic business. At the close of the war he participated in the negotiations of Adrianople and was mainly responsible for the Treaty of San Stefano. On account of disagreements with Gortchakoff he retired from office, but on the accession of Alexander III (1881) he was recalled and made Minister of the Imperial Domains and then of the Interior. While holding this office he attained prominence as a persecutor of the Jews. His administrative inability led to his dismissal, June 21, 1882.—His brother ALEXEI PAVLOVITCH (1842-1906) rose to be lieutenant general, and was Governor-General of Kiev in 1889-97 and of Odessa for a short time in 1905. He was a noted reactionary and was assassinated in December, 1906.

IGNATIUS, ig-na'shi-ús, SAINT (c 790-878). A patriarch of Constantinople, youngest son of the Emperor Michael I. In 813 the Armenian usurper Leo V forced him to enter a cloister. From the position of abbot the Empress Theodora raised him to that of Patriarch of Constantinople (847). He had no sympathy with the iconoclasts and so was in favor with the Empress. On the other hand, he excommunicated her brother Bardas, who made him one of his first victims when he took the reins of government for the young Michael III (857). Ignatius refused to abdicate until forced to do so in 866. He was reinstated on the accession of the

Emperor Basilus in 867. He is still a favorite saint in the Greek church and his day is celebrated on the 23d of October.

IGNATIUS OF ANTIOCH, SAINT. Bishop of Antioch in the reign of Trajan, and author of seven Greek letters which are included among the works of the Apostolic Fathers (qv). Little is known of Ignatius' life. He was born probably not far from the middle of the first century. Syria appears to have been his home. Tradition says that he was a disciple of the Apostle John, which is not impossible. Much less likely is the tradition which makes him the child whom Jesus took in His arms and blessed. There is no reasonable ground for doubting that Ignatius was Bishop of Antioch, but we do not know how long he held that office. The statement of Origen and Eusebius that he was the second Bishop may be accepted. This leaves Peter out of account and makes Ignatius the successor of Evodius. Respecting the close of his life we have more definite information. He was condemned to be killed by wild beasts in the arena and for that purpose was taken to Rome, under guard of 10 Roman soldiers. They passed through Asia Minor, stopping here and there and being received with Christian hospitality by the churches along their route. At Smyrna Ignatius wrote letters to the churches of Ephesus, Magnesia, Tralles, and Rome. Farther on, at Troas, he wrote to the Philadelphians, the Smyrniacans, and to Polycarp, Bishop of Smyrna. He then was led to Rome, where he suffered martyrdom, probably at some time between 107 and 117 A.D., though Harnack would extend the time to 125 A.D. It was believed, at a considerably later time, that his remains were carried to Antioch for burial.

The extant *Martyr Acts* of Ignatius are not authentic. Long and bitter controversy has raged over the epistles which bear his name. They are extant in several different versions, especially three: (1) *the longer Greek*, containing 13 epistles, (2) *the shorter Greek*, containing seven epistles, (3) *the Syriac*, containing only three epistles. The critical question is, Which form, if any, is the genuine one? Opinions have varied widely. It has been held (a) that all the recensions are spurious, (b) that the shorter Greek form alone is genuine, (c) that the Syriac alone is genuine, (d) that, of the shorter Greek form, all the epistles except Romans are genuine, and (e) that Romans only is a genuine epistle. The best modern criticism holds to the authenticity of the seven epistles in the shorter Greek form. There is almost contemporary witness borne to the Ignatian letters in the Epistle of Polycarp to the Philippians, where the usually accepted letters are mentioned. See POLYCARP.

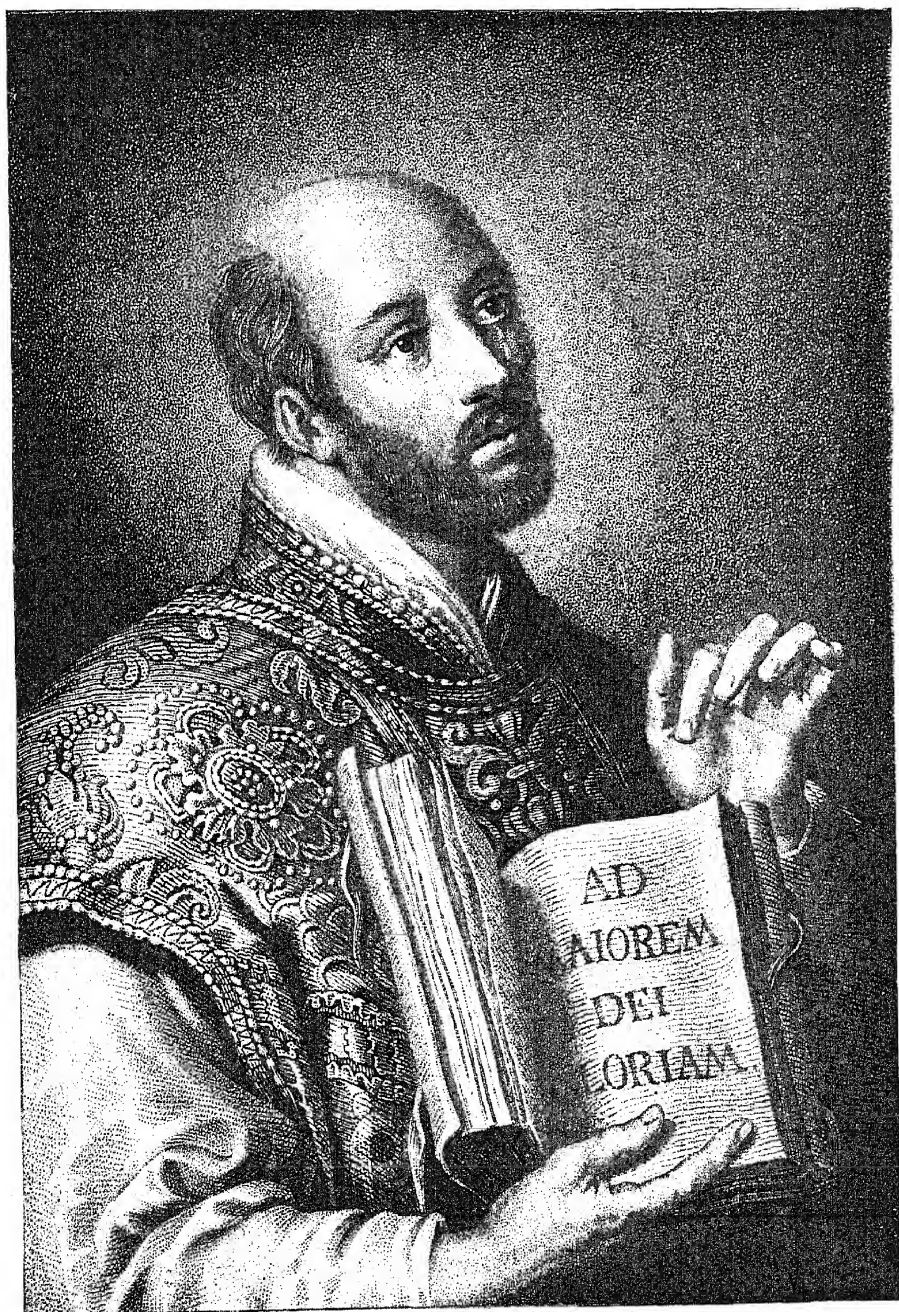
Accepting these seven as genuine letters of Ignatius, we learn to know their author as a fervent, enthusiastic Christian bishop, of intense zeal for martyrdom. He constantly insists on maintaining allegiance and obedience to the bishop, who is the centre of unity. It is evident that the monarchical episcopate, i.e., the system of having one bishop over each church, had already been developed in Syria and other portions of the East, whatever may have been the case elsewhere. No early Christian writer is so important for the history of the hierarchy as Ignatius. The heresy against which Ignatius warns is chiefly docetism, for he declares that Christ suffered in fact, not merely in appearance. He also warns against Judaizing heresies.

From the doctrinal point of view Ignatius is highly important, standing as he does in the line of catholic development which passes from Paul and John, through Ignatius and Irenæus, to the full-grown Nicene theology. It is in his letter to the Christians of Smyrna that we meet for the first time with the phrase "the Catholic Church," which here means "the universal Church." He also uses the term "eucharist" for the Lord's Supper. But, above all else, his epistles bear witness to the earnest, devoted spirit of early second-century Christianity and to the vitality of faith in the age succeeding that of the Apostles.

For the best edition of Ignatius, consult Lightfoot, *The Apostolic Fathers Part II, S. Ignatius and S. Polycarp* (London, 1889), with English translation. Text and translation are also found in the small edition of Lightfoot, *Apostolic Fathers* (ib., 1893), English translation alone in the *Ante-Nicene Fathers*, edited by Roberts and Donaldson, vol. 1 (Buffalo, 1886). In general, consult Smith and Wace, *Dictionary of Christian Biography* (4 vols, Boston, 1877-87). Cruttwell, *Literary History of Early Christianity* (London, 1893), Von der Goltz, *Ignatius von Antiochien* (Leipzig, 1894), Krüger, *Early Christian Literature* (New York, 1897), Harnack, *Chronologie der altchristlichen Literatur* (Leipzig, 1897). Catholic presentations of his teaching are in Newman, *Historical Sketches*, vol. 1 (London, 1890), and Gasquet, *Studies* (ib., 1904).

IGNATIUS OF LOYOLA, lo-yō'la, SAINT (1491 or 1495-1556). The founder of the Jesuits. Inigo Lopez de Recalde was the youngest of 13 children, of a noble family. He is usually said to have been born on Christmas night, 1491, but the Bollandists and Polanco are authority for the change to 1495. He was born in the ancestral castle of Loyola, near Azpeitia, in the Basque Provinces, not far from the French frontier. At 14, after a scanty education, he became a page at the court of Ferdinand the Catholic. Court life grew distasteful after some years, however, and he became a soldier under his relative, the Duke of Najera, in 1517. He fought bravely against the Navarrese, the Moors, the Portuguese, and the French. He had reached the rank of captain when, while directing the defense of Pamplona against the French in the war between Francis I and Charles V, he was wounded severely, May 20, 1521. He was taken prisoner and conveyed to the castle of Loyola. As a result of the wound, one leg was badly deformed. This would have been very unsightly in the fashionable hose of the day, and he bade the surgeon reduce the deformity at any cost. The leg was rebroken, and he bore the operation and consequent suffering without complaint. His convalescence was prolonged, and time hung heavily on his hands. He asked for some romances of knight-errantry then popular, but there were none in the castle. Instead they brought him a translation of Ludolf of Saxony's life of Christ, and some lives of the saints. Ignatius' life as a soldier had been the careless and gay one of an officer. For want of anything better to do, however, he read and reread these pious books. The spiritual achievements of St. Francis and St. Dominic came to replace the deeds of his knightly heroes in his imagination. He began to see visions, and his family grew alarmed lest he should rashly surrender his career for a life of religion. As soon

as he was able he went to the shrine of the Virgin at Montserrat, where, after a confession of his whole life on the vigil of the Annunciation, March 24, 1522, he hung up his arms as a votive offering and a symbol of his renunciation of his military career and of his entire devotion henceforth to the spiritual warfare, gave away his rich clothing, and went to the neighboring town of Manresa, where he served the sick and poor in the hospital. He lived in a cave, and his austerity finally impaired his health, though it was at this time that his *Spiritual Exercises*, from which he drew great spiritual strength, took form in his mind. Thus began a life of extreme asceticism, which, though it often endangered his health, yielded to his mystical mind ecstatic experiences. After this he went on a pilgrimage to the Holy Land and would have stayed at Jerusalem to spread the gospel among the infidels, but was forbidden by the local authorities. He returned to Barcelona in 1524. Realizing now that to do good he must have more knowledge, he began, at the age of 33, the rudiments of grammar in a public school beside boys. After two years he went to the new University of Alcalá and later to Salamanca. Because of public religious teaching with what was thought insufficient education, he incurred the censure of ecclesiastical authorities at both places. In 1528 he repaired to Paris to continue his studies. He was robbed by a companion and had to lodge in a hospital, where he did menial work for his support while attending the university. During his summer vacations he visited Spanish merchants in Antwerp, Bruges, and London so as to obtain money to continue his studies. During his student years he had no resources but the charity of the faithful. His earlier companions did not all remain his followers, but at Paris he formed a pious confraternity, out of which developed later the Society of Jesus. (See JESUITS.) Most of these were men of unusual ability. One became later the great Apostle of the Indies, Francis Xavier, and three, Lainez, Salmeron, and Lejay, became the leading theological advisers to the Council of Trent. One of the others, Faber, received the honors of beatification from the Church. In the crypt of the church of the Martyrs, on Montmartre, on the Feast of the Assumption, Aug. 15, 1534, the little band took their vows. At first their intention was to evangelize Palestine. They made their way to Venice for this purpose, but the war between the Christians and the Turks closed the way to the Holy Land, so they resolved to offer themselves to the Pope for any service he might assign. Paul III received them with great kindness. The pulpits of churches in various Italian towns were assigned to them, and their burning discourses and saintly lives soon attracted attention. No other of them was so effective as Ignatius himself, who spoke as the plain, blunt, but intensely earnest soldier. In 1539 Ignatius asked for papal approbation of his order. In spite of opposition to the erection of another religious order in the Church, the Pope read the draft of the Constitutions, and said, "The finger of God is here." While occupied with his constantly growing society, of which he was the superior, Ignatius found much to do besides its direction and the writings of the Constitutions. Though a Spaniard, he devoted himself to the care of the Jewish converts and secured the correction of many abuses in the treatment of those who wished to remain orthodox Jews. He



IGNATIUS LOYOLA
AFTER A PAINTING BY RUBENS

founded a house for fallen women and was not ashamed to be seen conducting them to it through the streets. He tried to prevent the occasions of their fall by providing a home for friendless girls. He established orphan asylums for boys and girls. The influence he acquired can be understood from the fact that he was able to end a dispute between the Pope and John III of Portugal that threatened serious harm to religion at the moment, and another between the citizens of Tivoli and their ruler, Margaret of Austria.

His writings consist only of the Constitutions and rules of the Society of Jesus, his Letters, and the *Exercitia Spiritualia*. This last little book of scarcely 100 duodecimo pages has proved one of the most influential works ever written. In 1552 he began to teach his spiritual exercises to his companions, and the earliest extant text of their publication dates from 1541. From the very beginning this work formed the basis of the spiritual training of the Jesuits themselves and the mold in which their retreats and missions to the people were cast. It has come to be the acknowledged model after which the missions and retreats given by most of the other religious orders of the Roman Catholic church are conducted. Three things are treated of particularly in the book: the service of Jesus Christ, placed above all that the kings of the earth can offer, the discernment of spirits, and finally the choice of a state of life. It was this book that accomplished the reforms the Jesuits effected. The Constitutions of the Jesuits are entirely the expressions of Ignatius' ideas. They have been but slightly modified, never in any essential, by successive General Congregations. It is often said that Ignatius founded the Jesuits to counteract the effects of the German Reformation, but there is good authority for believing that when Ignatius conceived the idea of his order he had not even heard the name of Luther. Even more than a decade later, he seems to have paid little heed to the religious movements in Europe, especially in Germany. One year before his death, in 1555, the society comprised eight provinces, divided as follows: Italy, two; Spain, three; Portugal, one; Brazil, one; India and Japan, one. In Germany there were but two residences, Cologne and Vienna. He died in Rome, July 31, 1556. He was beatified in 1609 and canonized in 1622.

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Consult, also, Hughes, *Loyola and the Educational System of the Jesuits*, 'Great Educational Series' (New York, 1892), and J. Stephen, *Essays in Ecclesiastical Biography* (2 vols., ib., 1907).

IGNATIUS' BEAN, SAINT See SAINT IGNATIUS' BEAN

IGNEOUS ROCKS (Lat. *igneus*, fiery, from *ignis*, Skt. *agni*, fire) Rocks produced as the result of solidification from a molten condition. They are also often called eruptive rocks, although the word 'eruptive' belongs more properly to that class of igneous rocks that have cooled at the surface. The igneous rocks include lavas which have been poured out upon the earth's surface, the fillings of the fissures, pipes, and other passages in the earth's crust through which molten material was conducted during its rise to or towards the surface, and the larger masses which consolidated at great depths and are commonly known as plutonic rocks. The agents of decomposition and disintegration of rock material and those of transportation and degradation necessarily expose to view these several types of igneous rocks, each of which possesses certain general and distinguishing characteristics. The most noteworthy general characteristic of the igneous rocks, when unmetamorphosed, is a massive structure without lamination or bedding, such as is characteristic of the sedimentary or clastic rocks on the one hand, or schistose structure, such as is developed in the metamorphic rocks. Inasmuch, however, as it has been shown that many *metamorphic rocks* (qv) have been formed from igneous rocks, it is clear that no sharp line can be drawn to separate these classes on the basis of structure, although in the main the above distinction applies. See PLUTONIC ROCKS.

Prominent among the textures characteristic of the igneous rocks are the granitic, the porphyritic, and the vitreous, or glassy. The granitic texture is crystalline throughout and consists of an interlocking mosaic of the different mineral constituents, the nearly uniform size of the grains indicating that the process of consolidation was essentially an uninterrupted one, and that practically the same conditions obtained during all stages of the process. In this mosaic the mineral constituents which first separated from the magma have more or less perfect crystal outlines, whereas those of later separation have irregular boundaries because sufficient space was not available in which to build out their crystal faces. The porphyritic texture, which is the next most common among the igneous rocks, has crystals of one or more of the mineral constituents of the rock embedded in a base or ground mass of smaller crystals or of rock glass. The crystals embedded in the ground mass are known as porphyritic crystals, or phenocrysts (qv). It is generally supposed that the phenocrysts were crystallized out of the magma in a stage of the process of consolidation earlier than that which produced the ground mass of the rock, and as most igneous rocks of porphyritic texture have been formed either at the surface of the earth or at quite moderate depths below it, it is supposed that the phenocrysts were formed at considerable depths before the magma rose to or near the surface. In the lavas that flow from Vesuvius or from most other volcanoes, the phenocrysts may be picked out of the still molten lava as it flows from the volcano. The vit-

reous, or glassy, texture is one of comparatively infrequent occurrence, but is represented by obsidian (qv) and pitchstone. It is now generally recognized that many igneous rocks which have an entirely crystalline texture were once largely composed of rock glass, which has devitrified through processes of chemical alteration and crystallization.

In addition to the above textures characteristic of igneous rocks and dependent upon the state of crystallization of the rock substance, there are other features which call for notice. One of the most common observed in lava (qv) is a peculiar crumpled lamination of the rock caused by the arrangement of mineral constituents of unequal dimensions with their longer axes parallel to the crumpled lines. This fluxion structure is conditioned by the flow of the lava, the crumpled lines indicating the direction of flow. Other structures, as the amygdaloidal, scoriaceous, and pumiceous, which indicate different grades of cellular or porous texture, are conditioned by the steam once held in the lava and the opportunities for expansion and escape of this steam as the lava approached the surface of the earth.

In chemical composition the igneous rocks show wide variation, though limits are set by the laws of formation of magmas. No such limits are set for the clastic rocks. By processes of alteration the igneous rocks change into the metamorphic rocks (as do also the clastic rocks), so that no sharp line can be drawn to separate these great divisions.

Great difficulties arise in the systematic classification of igneous rocks by reason of the many ways in which it is possible to describe them, and the varying importance which is attached to each method, hence great difference of opinion exists among petrographers as to the best scheme to be adopted. On the continent of Europe, and especially in Germany, the manner of occurrence of a rock, whether as a boss or batholith (qv), as a dike (qv), or as a sheet or flow, is given the first importance, and the age of the rock, once considered paramount, still retains its importance in the secondary classification. In America opinion seems to favor as bases of classification the chemical composition, the texture, and the mineral composition, but the future must be awaited before any classification free from serious objections is likely to be adopted. The scheme which has the greatest number of followers among recent workers in petrography perhaps is the so-called quantitative classification proposed by Iddings, Cross, Washington, and Pirsson, and described in the *Journal of Geology* for 1902. The basis of this classification is chemical composition, and rocks of similar chemical character are grouped together. The chemical composition is expressed in terms of certain standard minerals, which are divided into two groups, the alkali-calcic and the iron-magnesia groups. The rocks are separated into five main classes according to the relative proportions of the minerals present belonging to the two groups. The principal defect of the scheme from a practical standpoint seems to be that an exact chemical analysis is a necessary preliminary to placing a rock in its proper class.

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IGNIS FATUUS, fāt'ū-ūs (Lat., vain fire)

A luminous appearance, frequently seen in marshy places, in churchyards, and over stagnant pools. It generally appears a little after sunset as a pale, bluish-colored flame, varying in size and shape, sometimes it shines steadily till morning, at other times disappears, and reappears within about half-hourly intervals. It floats in air at about 2 feet from the ground, is sometimes fixed, and sometimes travels with great rapidity. Many efforts have been made to discover its cause, but so varied are its appearances and so void of any common principle that these attempts have failed. Two of the various explanations offered may be mentioned here. The first is that the ignis fatuus is due to phosphureted hydrogen gas, PH_3 , which possesses the property of igniting when it comes in contact with dry atmospheric air, the gas would be generated by the decomposition of animal matter present in a marshy soil. The second is that it is due to the combustion of methane, or marsh gas, CH_4 , produced by the decomposition of vegetable matter, but though this supposition satisfactorily accounts for many appearances connected with the ignis fatuus, the gas itself is not spontaneously combustible, and an additional supposition becomes necessary to account for its ignition. The probable conclusion is that a number of phenomena, apparently similar, but arising from different causes, are aggregated under the term "ignis fatuus."

The appearance of ignis fatuus is not a common phenomenon, and many distinguished naturalists who desired to investigate it have never succeeded in finding it, but it is not unfrequently seen in the north of Germany, the swamp and moorland districts in the south and north-west of England, and in the lowlands of Scotland. It is seen in the above places from the middle of autumn till the beginning of November. In former times the ignis fatuus, under the names of Will-o'-the-Wisp, Jack-o'-lantern, Spunkie, etc., was an object of superstition among the inhabitants of the districts where it appears and was believed to be due to the agency of evil spirits attempting to lure travelers to their destruction.

IGNITION See INTERNAL-COMBUSTION ENGINE AND MOTOR VEHICLES.

IGNJATOVIC, Ig-nyāt'o-vich, IAKŠA (JACOB) (1824-89). A Serbian novelist and critic, born in Szent-Endre, Hungary. He received a legal education at Budapest and elsewhere. After the revolution of 1848 he lived for some time in Paris, and he traveled extensively in south Europe. Returning to Hungary, he became editor of the *Review* (*Letopis*) of the Serbian Literary Society (Matica) and was twice elected deputy to Parliament. He wrote numerous novels, historical, humorous, and social, of which the best are *George Brankovich* (1859), historical, and *The Sufferers and Old and New Masters*, dealing with contemporary Serbian life. He also wrote short stories and political and literary essays.

IGNORANCE OF THE LAW One of the important maxims of the common law is *Ignor-*

rance of the law excuses no one It is not, however, an aphorism of universal application, nor is it to be pressed into the service of injustice, neither does it warrant the presumption that every one knows the law. There is, of course, no such presumption. Yet the rule that ignorance of law shall not serve as an excuse for illegal acts or omissions is common to all systems of law and is not only expedient but necessary.

In criminal law particularly the maxim gives expression to an important principle of public policy. To permit a person who has committed a crime to escape the penalties of his wrongdoing by the plea that he did not know that the act was a crime, would plainly be subversive of the whole system of criminal justice. Yet even in criminal cases the principle has real or apparent exceptions. If a person is indicted for larceny, he may show that he honestly believed the property to be his own, although it appeared that this belief was due to his ignorance of a rule of law which vested the property in another. This results from the fact that he does not commit the crime of larceny unless he intended to appropriate another person's property to his own use. Had the indicted person been sued for conversion by the true owner, his ignorance of the law would have been no excuse. In the civil action for conversion his motive, or intention, or belief in taking would be immaterial. One who takes and uses property as his own acts at his peril. So, if a person enters into an honest and fair contract, he cannot absolve himself from its obligations by showing that he would not thus have contracted had he known the legal consequences of so doing.

In general it may also be said that a person who has paid money in ignorance of the law cannot recover it in a quasi-contract action as money paid under a mistake. This means that no man will be permitted to exempt himself from a duty, or shelter himself from the consequences of infringing a prohibition imposed by law, or acquire an advantage in opposition to the legal rights and interests of another, by pretending error or ignorance of law. See *MISTAKE, QUASI CONTRACT*.

IGNORANTINES (from Lat. *ignorare*, to be ignorant), **FRATRES IGNORANTIE**. A religious congregation of men in the Roman Catholic church, associated for the gratuitous instruction of poor children in sacred as well as secular learning. See **BROTHERS OF THE CHRISTIAN SCHOOLS**.

IGOROT, i'gô-rô't. The designation Igorot is a term meaning 'mountain people,' which was formerly applied to all the interior people of northern Luzon. At present it is generally understood to refer to the pagan inhabitants of Bontoc, Benguet, Lepanto, and Amburayan sub-provinces. In culture these people are much alike except for the fact that those outside of Bontoc have been more modified by the white man. Both are agricultural and depend almost solely on the fields for sustenance. Like the Ifugao, they construct mountain-side terraces, to which they conduct water by means of flumes and ditches. The houses, which are grouped in villages, have grass roofs which overhang the board side walls. The ground floor is used as a sleeping apartment and general workroom, while in the roof is a dimly lighted apartment which serves as a kitchen and storeroom.

The people of both divisions are of excellent build, but the inhabitants of Bontoc are some-

what larger and more aggressive than the Benguet-Lepanto people. The Bontoc are addicted to head hunting and until recent years have been ardent warriors. Their villages are divided into *atos* (or divisions), in each of which is to be found a special house for the unmarried men and boys, while a similar structure serves for the girls. The Philippine census of 1903 stated the total number of the Igorot people as 211,520.

While less aggressive than the people of Bontoc, the Benguet-Lepanto Igorot have developed further in many ways, and are now, as they have been for many centuries, miners and workers in gold and copper. Consult Jenks, *The Bontoc Igorot* (Manila, P. I., 1905). See **PHILIPPINE ISLANDS**.

IGOR'S (é'gôr'z) **BAND**, **SONG OF** (Russ. *Slovo o polku Igorevê*). An early Russian prose narrative, of uncertain date. It recites the unfortunate outcome of the expedition (1185) of Igor (Scand. Ingvar), Prince of Novgorod-Syever'sk, into the country of the Polovtsy in southern Russia. The Prince was defeated and taken prisoner, but later he escaped with the help of a slave. This song, so called, is not contemporary with the events it relates. Generally admired are the lyric passages depicting the grief of Nature over the Prince's capture, the lament of Yaroslavna, his consort, on hearing of his fate, and the escape of Igor. The original manuscript, discovered by Count Musin-Pushkin and published in 1800, was destroyed in the Moscow fire of 1812. The editing was very poor, and another copy found in 1864 among Catharine II's papers is hardly more satisfactory. Its authenticity has been an object of bitter controversy, and a vast literature on the subject has grown up. A translation by Wolfsohn in *Schönwissenschaftliche Literatur der Russen* (Leipzig, 1843) and one with introduction and notes by Paucker (Berlin, 1884) are very good. There are also French translations by Rambaud (*La Russie épique*, Paris, 1876) and others. There is an English translation by Wiener in *Anthology of Russian Literature*, vol. 1 (New York, 1902).

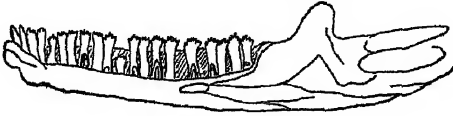
IGRAINE, i-grân'. See **IGERNA**.

IGUALA, or **IGUALA DE ITURBIDE**, é-gwa'la dâ é'tô'r-bê'dâ. A town in the State of Guerrero, Mexico (Map Mexico, J 8). It is in a rich mining and agricultural district and is the largest town of the state. The first silver mines worked by the Spaniards in Mexico were near here. It has a prominent place in Mexican history from the fact that the Plan de Iguala, or the Plan of the Three Guarantees, was announced here by Iturbide on Feb. 24, 1821. (See **MEXICO, HISTORY**.) In 1907 a severe earthquake destroyed many buildings in the town. Pop., 1910, 8195.

IGUALADA, é-gwa-la'pa. A city in the Province of Barcelona, Spain, situated on the river Noya, in a mountainous but fertile district, 46 miles by rail northwest of Barcelona (Map Spain, F 2). It was formerly a fortified town, but its walls are now in ruins. It has manufactures of cotton, linen, and other textiles. The famous mountain and Benedictine monastery of Monserrat lies 12 miles to the east. Pop., 1900, 10,476. 1910, 11,754.

IGUANA, i-gwa'nâ (Sp., from the Haitian name, *igoana*, *huana*, *yuana*). A genus of tropical American lizards, representing the family Iguanidae, of which there are about 55 genera and 250 or more species. In external and internal structure iguanas closely resemble the Agamidae.

of the Old World and are distinguished mainly by the pleurodont dentition. The tongue is thick and villous. All the North American forms possess femoral pores, but few of the South American species have them. In habits also the Iguanidae closely resemble the Agamidae, save that



TEETH OF AN IGUANA

there are no flying forms to correspond with the flying dragon of the Agamidae, while in America some of the iguanas, such as *Anolis*, have digital expansions, and others are semimarine, neither of which conditions is met with in the Old World family. The family contains several of the largest lizards. Most of the species are arboreal, but some of them live on the surface of the sand and stones of the desert and have a depressed form. Several species live wholly, or almost wholly, on vegetable food—the blossoms and leaves of plants. For this reason the flesh of several of them, especially of the genus *Iguana*, is very palatable, is sought by the natives of Central and South America as food, and is sold in their markets in considerable quantity. One of the species most eaten is *Iguana tuberculata*, a repulsive-looking lizard, with a high, dorsal, fringed ridge and a large dewlap. (See Plate.) It basks on the limbs of trees during the warm hours and while thus situated seems rather indifferent to the approach of man. It is fond of music and of having the body stroked. The natives take advantage of these facts, whistle a lively tune as they approach, and when near enough stroke the sides of the iguana with a stick until they succeed in getting a noose over its head. (Consult Belt, *Naturalist in Nicaragua*, London, 1888.) The natives also dig them out of their burrows or chase them into trees with dogs trained for the purpose. On the Galapagos Islands there is a semiaquatic genus, *Amblyrhynchus*, whose species feed on seaweeds along shore. This lizard is described in detail by Darwin, in chap. v of his *Naturalist's Voyage* (London, 1860). There are other species of the same genus that live for months without water by feeding on the succulent cactus. The great iguana of Jamaica, with the prominent serrate crest, is *Cyclura lophoma*. In the southwestern United States, from western Kansas to southern California and Mexico, dwell several genera of green, dark-gray, or brown iguanid lizards, such as *Uta*, *Holbrookia* (q.v.), *Ctenosaura*, and *Crotaphytus*. (See COLLARED LIZARD.) The large genus *Sceloporus* ranges not only over the western and central parts of the United States, but in all the eastern and Gulf States as far north as New Jersey and Indiana. Another widely distributed genus, *Anolis*, has two representatives in the South Atlantic States, popularly called chameleons. (See ANOLIS.) These lizards possess mimicry of color in a remarkable degree and have a considerable power of changing their color. They are insectivorous, and the wanton destruction of them is much to be deplored, for in their native habitats they are of considerable economic importance to agriculture. To this family belongs also the basilisk of Central and South America, so named on account of its fancied resemblance to the creature

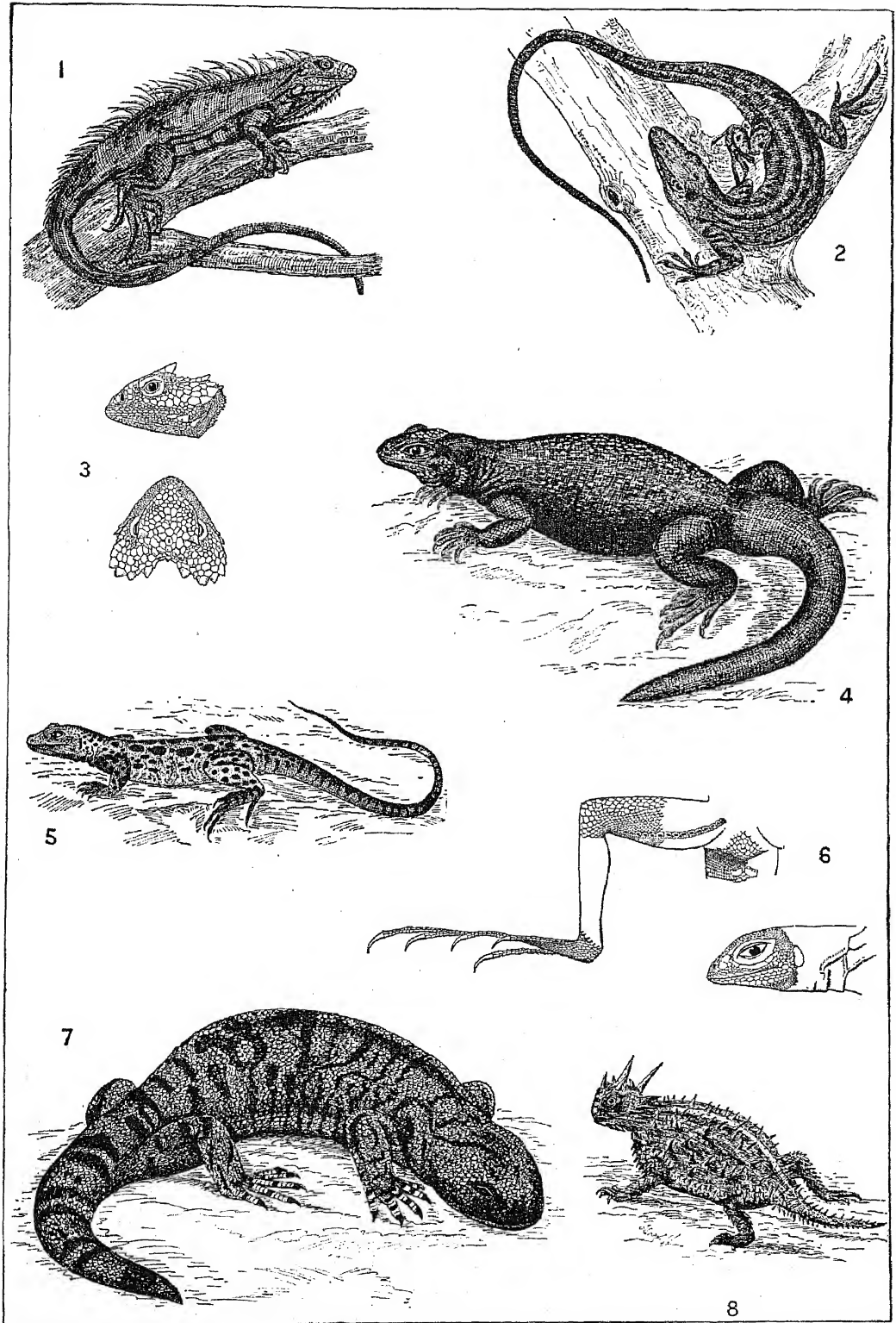
of fable. (See BASILISK.) It is a large, harmless lizard, found no farther north than southern Mexico. The family also includes those peculiar, spiny, short-tailed, flattened lizards known as hoined toads. (See HORNED TOAD.)

Consult G. A. Boulenger, *Catalogue of Lizards of the British Museum* (London, 1885), J. S. Kingsley (ed.), *Standard Natural History*, vol. 11 (Boston, 1885), L. H. Stejneger, *Death Valley Expedition* (Department of Agriculture, Washington, 1893), E. D. Cope, *Crocodylians, Lizards, and Snakes* (Smithsonian Institution, 1893), Hans Gadow, *Amphibia and Reptiles* (New York, 1901). See LIZARD.

IGUANODON, i-gwān'ō-dōn (Neo-Lat., from Eng. *iguana* + Gk. *ōdōs*, *odous*, tooth). A genus of ornithomimid dinosaurs, found fossil in Jurassic and Lower Cretaceous rocks of Europe. *Iguanodon* is perhaps the first dinosaur brought to light, for it was described by Mantell in 1825 from specimens found in Kent, England. The animal was 15 to 25 feet long, the head was large and narrow, the jaws heavy and furnished with numerous teeth of peculiar form that resemble those of the modern American lizard, *Iguana*. The anterior portions of the jaws are provided with strong, horny beaks like those of turtles. The fore limbs have four toes and a "spur" and are much shorter than the heavy three-toed hind limbs. The pelvis is elongated and the tail heavy, and there is a ridge of strong vertebral spines extending along the dorsal surface from the neck to the middle of the tail. All the bones are hollow. *Iguanodon* was an herbivorous dinosaur that walked on its hind legs and sat on a tripod formed by the hind legs and tail, after the manner of the kangaroo. It lived in great numbers in the swampy regions of England and Belgium and other parts of Europe during Jurassic time, as indicated by the mode of occurrence of its fossil skeletons, 29 of which were found at one time in Upper Jurassic sandstones of the coal regions at Bernissart, Belgium. *Iguanodon* has not been found in the Mesozoics of America, where it is represented by similar genera *Camptosaurus*, *Laosaurus*, and *Thespesius*. A very instructive account of the discovery and early history of *Iguanodon*, illustrating the method by which fragmentary material has after careful work yielded valuable results, is to be found in Mantell's *Petrifactions and their Teachings* (London, 1851). See also Woodward, *Outlines of Vertebrate Paleontology for Students of Zoology* (Cambridge, 1898). For more specialized articles, consult Dollo, "Quatrième note sur les Dinosauriens de Bernissart," in *Bulletin du Musée Royal d'Histoire Naturelle de Belgique*, 11 (Brussels, 1883), Woodward, *Geological Magazine* (London, 1895), Knipe, *Evolution in the Past* (1b, 1912). See CAMPTOSAURUS, DINOSAURIA.

IGUAZÚ, e'gwa-sōō'. A river of Brazil, which rises near the Atlantic Ocean in the State of Paraná, flows westward for about 790 miles, and empties into the Paraná River (Map: Argentina, J 3). It forms most of the boundary between the states of Paraná and Santa Catharina and also for a short distance between Brazil and Argentina (Misiones). The middle course is navigable for river steamers for some distance. The lower course is broken by numerous cascades and falls, some being from 30 to 90 feet in height. About 11 miles from its mouth are the wonderful Falls of Iguazú, one of the most magnificent cataracts in the world.

IGUANAS AND OTHER AMERICAN LIZARDS



1. IGUANA (*Iguana tuberculata*).
2. GREEN LIZARD (*Anolis principalis*).
3. NORTHERN HORNED TOAD (*Phrynosoma Douglassi*);
top of head, and profile.
4. CHUCKWALLA (*Sauromalus ater*).

5. LEOPARD LIZARD (*Crotaphytus wislizeni*).
6. DESERT LIZARD (*Callisaurus draconoides*); head and
hind limb.
7. GILA MONSTER (*Heloderma horridum*).
8. COMMON HORNED TOAD (*Phrynosoma cornutum*).

The Falls are formed by a double drop, each having a fall of about 180 feet. In the dry season there are two crescents, known respectively as the Argentine and Brazilian falls, each with a width of 800 yards. In the wet season the two are joined into one vast fall of some 4000 yards in width. Situated in the midst of a virgin tropical forest, the Falls are difficult of access. Those who have visited them say they surpass Niagara in magnitude and splendor. Consult Manuel Bernárdez, *De Buenos Aires al Iguazú* (2d ed., Buenos Aires, 1901).

IGUVINE TABLETS See **EUGUBINE TABLES**

IGUVIUM See **EUGUBINE TABLES**, **GUBBIO**

IHERING, **HERMANN** and **RUDOLF** See **JHERING**

I H N CLUBS See **LEND-A-HAND CLUBS**

IHNE, *é'ne*, **WILHELM** (1821-1902) A German historian, born at Furth, and educated at Bonn (1839-43). He was private tutor in England (1843-47) and returned to Liverpool, where he had charge of a school (1849-63), after two years' teaching at Elberfeld. In 1863 he went to Heidelberg, where he was made professor in 1873. He wrote *Questiones Terentianæ* (1843), *Researches into the History of the Roman Constitution* (1853), *Plea for the Emperor Tiberius* (1856), a *History of Rome* (1871-82), of which the German edition was published later, and *Early Rome* (1876).

IHRE, *é're*, **JOHAN** (1707-80) A Swedish scholar of Scottish extraction. He was born at Lund and educated at the University of Upsala, where he acquired a great reputation and carried off the highest honors. He subsequently traveled in France and England, was appointed underlibrarian to the Academy of Sciences on his return to Sweden, and rose through a variety of offices to be professor of belles-lettres and political economy (1748). Ihre's principal work is his *Glossarium Suogothicum* (1769), which may be regarded as the foundation of Swedish philology. It was published at the cost of the state, which gave Ihre \$10,000 to execute it. His numerous academical disputations, amounting to upward of 450, are still valuable, especially those on the Mæso-Gothic version of the Gospels by Ulfilas.

I H S See **ABBREVIATIONS**

II KAMON NO KAMI, *é-é ka'môn nô ka'mê*, or **II NAOSUKE**, **BARON** (1815-61). The Japanese statesman whose wise and vigorous statesmanship led to the opening of Japan to foreign nations and the establishment of friendly relations with them. He was the fourteenth son of Baron Ii, of Hikone on Lake Biwa, and was born of a line of ancestors known honorably in the tenth century. At 21 Ii went to Yeddo and had his mansion within the inclosure of Yeddo Castle at Sakurada, or Cherry Field. In 1850 he was made heir to the barony, assuming the highly honorable title of Kamon no kami, which gave him standing at the Shogun's court. In 1853 the question of foreign intercourse, precipitated by Commodore Perry, divided the opinions of the daimyos. Although he shared with many a feeling of hatred towards foreigners, Ii drew a line of distinction between personal feelings and national interests and declared himself to be in favor of intercourse with foreigners and of a revival of the military spirit for national defense. The Shogun Iyesada being childless and in poor health, the question of appointing an heir added to the complication of the period. Pressed

by Townsend Harris (*qv*) to sign the treaty which he had negotiated, and which the Mikado's court in Kyoto opposed, the Shogun had to face a crisis which admitted of no delay. On June 4, 1858, two days after the Mikado's refusal to approve the treaty, the Shogun appointed Ii to be Tairo or Regent, and on the 5th he was publicly installed, as the virtual ruler of Japan, but acting in the name of the Shogun. The Shogun Iyesada died suddenly, August 15, leaving no heirs. Carrying out his master's wishes, Ii appointed Kikuchiyo, who subsequently took the name of Iyémochi, the Prince of Kiushu, then a child of 12, to be his successor, and, taking the responsibility, in view of the rapid approach of the squadrons of the Russians, British, and French after their victorious campaign in China, he signed the liberal treaty drawn up by the United States Minister. The treaty with Great Britain followed on August 26 and that with France on October 9.

The great daimyos of Mito, Owari, and Echizen, however, opposed his nominee to the shogunate, the two former daimyos wishing also to have Echizen made Regent. On the outbreak of the long-gathering storm of opposition Ii crushed his enemies with a strong hand and dispatched an embassy to the United States to ratify the treaty. Among other triumphs he had the Princess Kazu, aunt of the present Emperor, betrothed in marriage to the young Shogun, and they were married in Yeddo in 1861. Before this, on the 23d of March, 1861, a snowy day, while on his way in his palanquin with a large following of bodyguards to the palace in Yeddo, they were attacked by a band of 18 assassins—17 from Mito, one from Satsuma, all of them Ronins. In the fight which ensued Baron Ii himself was stabbed, and his head cut off and carried away to the castle town of Mito and there exposed on a pole. For years the name Ii rested under a cloud, but it has been cleansed by Shimada Saburo in his book *Kai Koku Shimatsû* (Opening of the Country, Beginning and End), which has been translated into English under the title of *Agitated Japan* (1896). The man and the episode of his assassination have given rise to a considerable body of native literature, and the episode is treated in fiction by A. C. Maclay in *Mito Yashiki* (3d ed., 1899).

IIWI, *é-é'vé*. The English spelling by many voyagers of the name of a Hawaiian bird, otherwise known as mamo (*qv*), whose scarlet plumage was used for the native feather cloaks.

IKAU, *é-ka'ô*. A famous summer resort of Japan, situated in the Province of Kotsuke, about 20 miles by rail from Takasaki, and 88 miles from Tokyo. It is built on the slopes of the Haruna Mountain and is celebrated for the picturesqueness of its situation as well as for its two hot springs and rich vegetation. The mineral springs have a temperature of 113° F. and contain iron and sulphate of soda.

IK MARVEL, *ik mar'vel*. See **MITCHELL**, **DONALD GRANT**

IKUNO, *é-kû'nô*. A mining town of Japan, situated at an altitude of 1200 feet, in the Prefecture of Hyogo, about 35 miles northwest of Kobe, and 31 miles by rail from Himeji (Map: Japan, D 6). Its silver mines, the second largest in Japan, are operated by the government. Over 1500 persons are employed, and the mines are worked day and night. Besides silver they also yield gold. Pop. (est.), 3000.

ILAGAN, *é-la'gan*. The capital of the Prov-

ince of Isabela in Luzon, Philippines (Map Philippine Islands, C 2) It is situated at the mouth of the Grande de Cagayan, 270 miles north-northeast of Manila, and 36 miles north-west of Palanan, its nearest port Its tobacco industry is important Pop, 1903, 16,008

ILCHI, ēl'chē A city of China See KHOTAN

ÎLE DE FRANCE, ēl de frāns. The former name of Mauritius (qv), an island in the Indian Ocean

ÎLE DE FRANCE One of the old provinces of France, having Paris as its capital, and now mostly comprised in the departments of Seine, Seine-et-Oise, Seine-et-Marne, Aisne, and Oise During the last century of the Carolingian dynasty, the Ile de France was possessed by a race of powerful nobles who took the title of dukes of France One of the ablest of these was Hugh, or Hugues, surnamed the Great, or the White, who for 20 years previous to his death (956) virtually wielded the sovereign power under the Carolingian kings Louis IV and Lothar His son Hugh Capet eventually became the actual sovereign Consult A Longnon, "L'Île de France," in *Mémoires de la Société de l'Histoire de Paris et de l'Île de France*, vol 1 (Paris, 1875), and E W Rose, *Cathedrals and Cloisters of the Isle de France* (2 vols, New York, 1910).

ÎLE DE RE See RE, ÎLE DE

ILEOCÆCAL (il'ē-sē'kal) **VALVE** A valvular constriction that guards the passage between the large and the small intestine, at the opening of the cæcum It consists of a double fold of mucous membrane and is present in all mammals except certain carnivora

ILERDA. See LÉRIDA

ILEUM. See INTESTINE

ILEUS (Neo-Lat, from Lat *ileos*, Gk *ελεός*, *eileos*, *λεός*, *leos*, severe colic, from *ελεῖν*, *eilein*, to roll up, connected with Lat *volvare*, to roll, Eng *wallow*) A severe colic, due to intestinal obstruction Its symptoms are pain, nausea, and vomiting—which latter may contain feculent matter—rapid and feeble heart, and collapse The obstruction may relieve itself, or, if of mechanical origin, it may require operative interference to save life

I'LEX (Lat, holm oak) A tree often named in the Latin classics, the evergreen oak or holm oak (*Quercus ilex*) It is a native of most parts of the south of Europe and of the north of Africa and often attains large dimensions Its leaves are ovate-oblong, acute, leathery, hoary beneath, but they vary much in some respects, from the size of a sloe leaf to that of a beech and from being very spiny at the edge to perfect evenness Its wood is very hard and heavy, tough, durable, and useful, particularly for axles, pulleys, screws, and whatever is to be subjected to much friction. The acorns are of various quality, sometimes bitter and sometimes sweet and eatable In modern botany *Ilex* is the generic name of the holly (qv)

ILFORD, il'fērd An urban district in Essex, England, on the Roding, 7 miles east-southeast of London (Map London, D 9) Its modern growth and importance are due to the photographic industry, the establishment of dry-plate works, and a paper mill The erection also of the London County Council's Claybury Hall Lunatic Asylum, holding 2000 persons, has been instrumental in adding to the population The chapel of the twelfth-century mediæval hospital

of St Mary and St Thomas is of archæological interest The British Museum contains fossil remains of mammoths discovered here Across the river is Little Ilford Pop, 1891, 10,913, 1901, 41,244, 1911, 78,205

ILFRACOMBE, il'fra-kōōm A market town, seaport, and watering place on the north coast of Devon, England, finely situated amid picturesque irregular hills, on an inlet of the Bristol Channel, 11 miles north of Barnstaple (Map England, B 5) The harbor is formed by ramparts of rock and furnished with a lighthouse and a pier The climate is mild, and it has an excellent promenade Fishing is still an active industry, but shipping has declined It is an old town and in the fourteenth century was of considerable commercial importance Pop, 1901, 8557, 1911, 8935

ILGEN, ēl'gen, KARL DAVID (1763-1834) A German philologist and educator, born at Burg-holzhausen in Saxony and educated at Leipzig In 1789 he became rector of the Gymnasium at Naumburg, in 1794 professor of Oriental languages at Jena, and in 1802 rector of the Landesschule at Pforta, where he labored with conspicuous success for nearly 30 years His main works are *De Jobi Natura atque Virtutibus* (1788), *Urkunden des ersten Buches Moses in ihrer Urgestalt* (1798), *Die Geschichte Tobas nach drei verschiedenen Originalen übersetzt* (1800), *Hymni Homericæ* (1796), *Scolia Græcorum* (1798), *Opuscula Varia Philologica* (1797), *Anmadversiones ad Vergiliæ Copam* (1820). Consult Naumann, *Ilgeniana* (Leipzig, 1853)

IL GRECCHETTO See CASTIGLIONE, GIOVANNI BENEDETTO

ILI, ē'lē' A river which rises, under the name of Tekes, in the Tian-Shan Mountains, on the borders of Russia and China, not far from Lake Issyk-kul, flows at first in a northeasterly and then in a westerly direction, passing the town of Kuldja, and falls into Lake Balkhash in the Russian Central Asiatic Province of Semiretchensk (Map Asia, J 4) It is about 800 miles long, flows through a fertile and populous valley stocked with sheep and cattle, and is navigable from Kuldja

ILIAC ARTERIES. The two arteries formed by the bifurcation of the abdominal aorta The aorta (qv) divides at its lowest point—which is usually on the left side of the body of the fourth lumbar vertebra—into the two common iliac arteries, which pass downward and outward on each side to the margin of the pelvis for about 2½ inches and then divide into the external and internal iliac artery of either side The external iliac passes obliquely downward and outward to the femoral arch, when it enters the thigh and becomes the femoral artery The internal iliac is a short vessel, about 1½ inches in length, which divides into an anterior and a posterior trunk The anterior trunk divides into several branches, which supply the bladder, the rectum, the generative organs, and muscles both within and on the outside of the pelvis, with arterial blood, while the branches of the posterior trunk mainly supply muscles within and on the outside of the pelvis The importance of the internal iliac artery in carrying on the circulation in uterine life is noticed in the article FÆTUS

ILIAD. See HOMER

ILIAD OF FRANCE, THE A name sometimes given to the *Roman de la Rose* (qv).

ILIAN TABLET. See TABULA ILIACA.

ILIJC, il'ich, DRAGUTIN (1858—) A Serbian poet and critic. Besides some poems, his important works in prose are *Novels* (1892), *Splendid Pictures from the First Days of Christianity* (1896), *The Last Prophet* (1897), and several dramas.

ILIJC, JOVAN (1823-1901) A popular Serbian poet, born in Belgrade and educated at Kragujevac, Belgrade, and Vienna. He took part in the revolution of 1848-49 as a volunteer against Hungary, returning to Serbia, he became a member of the Supreme Court and from 1869 to 1873 he was Minister of Justice. There have been four editions of his poems, which are mostly written in the manner of Serbian folk poetry. The *Bysmylach* and the *Dervish Baba* are, however, of Oriental character. His prose writings are less important. His three sons were all writers.

ILIJC, VOYISLAV (1862-94). An important Serbian poet, born in Belgrade, he died in Pustina (Albania) while Serbian Vice Consul. The youngest and favorite son of Jovan Iljc, he thoroughly studied Russian literature, being greatly influenced by Pushkin. He appeared before the public with his poems, chiefly elegiac, about 1880, and during the following 15 years held a leading position among the poets of his nation, giving a new direction to Serbian poetry. A complete collection of his poems, originally published in various periodicals, appeared in 1907. He also wrote in prose, and left an unfinished tragedy, *Radoslav*.

ILION, il'i-on. A village in Herkimer Co., N. Y., on the Mohawk River and Erie and Baige canals, 12 miles east-southeast of Utica, on the New York Central and Hudson River and the West Shore railroads (Map New York, E 4). It has a fine public library and a hospital. The manufactures include firearms, typewriters, store fixtures, knit goods, and cabinet and filing cases. The water works and electric-light plant are owned by the municipality. One or two families seem to have moved to the site of Ilion about 1816, but there was properly no village here until about 1828. It was incorporated in 1852. Pop., 1900, 5138, 1910, 6588.

ILION, ILIOS. See ILUS, TROY.

IL'IONA (Lat., from Gk. Ἰλιόνη, Ἰλιονή). In Greek mythology, the wife of Polymestor, King of Thrace. She was the daughter of Priam and Hecuba and according to one legend brought up her brother Polydorus, who had been committed to the care of Polymestor. When the latter, instigated by the Greeks, who wished to exterminate the race of Priam, designed the murder of Polydorus, Ilona substituted his own son, Deipylus, who was put to death instead. According to a story given by Vergil, *Aeneid*, III, 50 ff., Polymestor murdered Polydorus for the sake of a great sum of gold Priam had sent with Polydorus for safe keeping.

ILIONEUS, i-l'ō-nūs (Lat., from Gk. Ἰλιόνηος). The son of Niobe, killed with all her other children. He was praying, and Apollo would have saved him if the arrow had not already been sent.

ILITHYIA, il'i-thi'ya (Lat., from Gk. Εἰλεθυία, Εἰλεθυία). The Greek goddess who presided over childbirth. The plural form (Ilithyiae) is used in the *Iliad*, but elsewhere only one goddess of the name is mentioned.

ILIUM. See TROY.

ILIUM (Lat., flank). A portion of one of

the bones of the pelvis, the os innominatum. In the undeveloped child it is a distinct portion, which afterward becomes united to the pubis in front and to the ischium behind and below. It is the hip bone, or haunch bone. See PELVIS.

ILKESTON, il'kēs-ton. A market town in Derbyshire, England, 9 miles northeast of Derby, on an eminence in the valley of Erewash (Map England, E 4). There are manufactures of hosiery, lace, and stoneware, and coal and iron works in the vicinity. The town has a medicinal mineral spring and baths, which are now closed. It obtained a grant for a market and fair in 1251, but was incorporated in 1887. It owns its gas, water, markets, and cemetery. Pop., 1901, 25,384, 1911, 31,673.

ILKHANS, el-kanz'. See MONGOL DYNASTIES.

ILLÆNUS, il-lē'nūs. An important genus of trilobites, the type of the family Illænidæ, characterized by its large convex cephalic and caudal shields which are nearly smooth, both the glabella of the former and the axis of the latter being indistinct. The thoracic segments, usually 10 in number, are also smooth. The genus is represented by numerous species in the Ordovician and Silurian of Europe, Asia, and North America. See TRILOBITA.

ILLAMPU, ē-lyam'pōō. A mountain of the Andes. See SORATA.

ILLA-TICSI, ē'lya-tēk'sē (Quichua, Eternal Light). A name given to the supreme god of the Peruvians, Uiracocha.

ILLE-ET-VILAINE, ēl'-ā'-ve'lān'. A maritime department in the northwest of France, a portion of the old Province of Brittany, lying between the English Channel and the Department of Loire-Inférieure (Map France, N, D 4). Area, 2699 square miles. Pop., 1911, 608,098. It is watered chiefly by the rivers from which it derives its name—the Vilaine, and its tributary, the Ille. Flax, hemp, wheat, buckwheat, oats, barley, potatoes, and fruits are extensively produced, and the cider of this district is esteemed the best produced in the country. The department is famous for its dairy products. Cattle are reared in great numbers, iron, zinc, and lead are worked, and great varieties of linen and woolen fabrics are manufactured. The seaports have large fisheries and yearly equip fleets for the Newfoundland banks. Rennes is the capital, and Saint-Malo the principal seaport.

IL'LEGALITY. A legal condition or status resulting from the performance or attempted performance of an act forbidden by law. The act may be a contract or a conveyance or devise of property for a forbidden purpose or in violation of some principle of public policy, and the effect of the illegality is to render the transaction ineffectual as a legal act and, therefore, unenforceable in any proceeding at law or in equity. Illegality may result either from a statute prohibiting an act, as gaming or the taking of usury, or from general considerations of morality and public policy, as in the case of agreements for illicit cohabitation or conveyances in fraud of creditors. Hence we have the classification of such acts as evils prohibited by law (*mala prohibita*) and acts wrongful in themselves (*mala in se*).

The doctrine of illegality finds its most frequent application in the law of contracts. It is a general rule that the law will never give its aid to a party in the enforcement of an illegal contract into which he has entered, whether the same be in direct violation of a statute, against

public policy, or opposed to public morals. This rule is, however, subject to the qualification that, in the case of *mala prohibita*, an innocent party to such a contract, as where a debtor pays usurious interest, is not estopped from asserting such rights as he may have thereunder. But where the parties are *in pari delicto*, as is usually, if not always, the case, where the transaction is *malum in se*, the rule is rigorously applied to each and every one of

the children of a man and woman cohabiting professedly as husband and wife are legitimate. In France, where informal unions are common, this rule does not hold. Children of such a union are considered illegitimate. A great variety exists as to theory and practice in different lands, and reference must be made to special treatises on the subject. Illegitimacy has been much discussed from three distinct points of view—the moral, the economic, and the legal.

COUNTRY	1900			1910		
	Total births	Illegitimate	Per cent illegitimate	Total births	Illegitimate	Per cent illegitimate
England and Wales	926,304	36,314	4.00	896,962	36,635	4.10
Ireland	101,459	2,702	2.70	101,963	2,833	2.80
Scotland	131,355	8,503	6.50	124,000	8,492	7.00
Germany	* 2,045,286	* 183,504	* 8.90	1,982,836	179,584	9.10
France	827,297	73,121	8.80	774,390	66,978	8.60
Belgium	* 194,268	* 14,919	* 7.68	176,413	10,837	6.10
Italy	1,067,376	63,406	6.00	1,144,410	56,615	4.10
Holland	162,611	4,247	2.60	166,527	3,327	2.00
Sweden	† 136,523	† 15,641	† 11.40	135,625	19,322	14.80

* 1899

† 1898

them. The defendant in a suit based on such a contract is permitted to set up the illegality, as a defense, not from any tenderness for him, but because, under our procedure, there is no other way in which the plaintiff can be prevented from enforcing the illegal obligation.

But the law has not been content merely to refuse to lend its aid to the accomplishment of an illegal purpose. It goes further and refuses to allow its process to be used to undo an illegal act by restoring the parties to their former condition. Thus, if one has paid a consideration or made a conveyance or mortgage for an illegal purpose, as to compound a felony or as a reward or inducement for illicit cohabitation, the courts will refuse to recognize the illegality of the transaction as a ground for rescinding it. Thus, in the case of a mortgage given for an illegal purpose, the mortgagee cannot foreclose nor the mortgagor redeem. The parties are simply left in the predicament in which they have placed themselves.

On the other hand innocent third parties are always entitled to relief against an illegal transaction, as when a creditor seeks to set aside a conveyance or contract made in fraud of creditors.

For specific applications of the principle of illegality in conveyances of land, see CONDICTION, and, in relation to corporate acts, CORPORATION, ULTRA VIRES.

ILLEGITIMACY (from Lat *in*, not + *legitimus*, legal, from *lex*, law). According to the civil and statute law as found in many states, the status of children born out of wedlock. In England children born out of wedlock have been held as illegitimate even upon subsequent intermarriage of the parents, also children of the deceased wife's sister have long been considered illegitimate. In Italy much confusion has arisen as to legitimacy, owing to the strife between church and state. It has been held that children resulting from marriages which had been solemnized by the church only were illegitimate, a civil marriage being necessary to give legitimacy to offspring.

Where common-law marriages are recognized

A remarkable fact illustrated by the accompanying tables is the low degree of variation in the rate of illegitimacy of the several countries during the lapse of a decade. The constancy of the rate points to social conditions deeply fixed in the national life. The following table for the German Empire and a number of its constituent states illustrates the same fact.

PERCENTAGE OF ILLEGITIMATE BIRTHS

	1900	1905	1910
German Empire	8.7	8.5	9.1
Prussia	7.3	7.2	7.7
Bavaria	13.2	12.6	12.2
Saxony	12.6	13.4	14.9
Wurttemberg	9.7	8.6	8.3
Baden	7.6	7.2	7.9
Hesse	7.9	6.9	7.6
Mecklenburg-Schwern	11.7	11.8	14.0
Saxony-Weimar	9.6	10.6	11.5
Oldenburg	5.5	5.5	5.7
Braunschweig	10.0	10.2	11.8
Anhalt	9.1	10.7	12.4
Schaumburg-Lippe	4.4	3.3	4.2
Alsace-Lorraine	8.7	8.5	9.1

For the Empire as a whole a slight reduction in the illegitimacy rate has taken place in the last 60 years, as the following table indicates.

AVERAGE PERCENTAGE OF ILLEGITIMATE BIRTHS IN THE GERMAN EMPIRE

Period	Per cent	Period	Per cent
1851-60	11.5	1881-1890	9.3
1861-70	11.5	1891-1900	9.1
1871-80	8.9	1901-1910	8.6

Of all subjects for statistical investigation, illegitimacy presents perhaps the most difficulties, owing to the lack of agreement among different legal authorities as to what constitutes illegitimacy and to the fact that it is a phenomenon naturally subject to concealment. Complete figures up to date cannot be secured, it

appears, however, that in civilized lands children born out of wedlock vary from 3 per cent to 12 per cent of all births. In most cases figures on illegitimacy exclude stillbirths.

Attempts have been made to demonstrate statistically the causes of illegitimacy, but with little success. The study, e.g., of the fecundity of women throws very little light upon it. In Russia, in 1896, the number of births to 10 marriages was 65, while the number of illegitimates was only 31 to 1000 births. During the same period in France there were only 27 births to 10 marriages, with 88 illegitimate births per 1000. In Austria there were 44 births to 10 marriages, and 145 illegitimates per 1000 births, and England showed about 36 births to 10 marriages and 42 illegitimates to 1000. It seems evident that the apparent strong tendency to childbearing cannot explain the phenomenon.

Equally uncertain is evidence gathered to show that climatic conditions have any large part to play. The following table (for 1896) presents some figures bearing upon the geographic distribution of illegitimacy. The division of cities is roughly made, those in the first column being north of lat. 52° N and those in the second column south of lat 49°.

ILLEGITIMATES PER 1000 BIRTHS

Northern		Southern	
Rotterdam	70	Naples	86
Hamburg	138	Venice	189
Berlin	154	Milan	204
St Petersburg	276	Paris	268
Copenhagen	279	Rome	194
Stockholm	396	Vienna	449

As is seen by the table, the difference is scarcely worth considering. It certainly does not corroborate the view that the southern cities are less moral than the northern.

It has long been believed that the moral conditions of the cities are lower than those of rural districts. Increased knowledge of rural conditions has tended to qualify this view. In general, it may be said that the rate of illegitimacy is higher in cities than in the country. This is due to a variety of causes. There is in the city less social restraint, less danger of detection of paternity, and a greater degree of abandonment on the part of the females. In some instances, however, as in Bavaria and in some other continental countries, the greater freedom of marriage laws and better industrial opportunities in the city render family life more convenient and irregular relations less common than in country districts, where the conditions of holdings hinder marriages. The high degree of illegitimacy is often an indication of certain laws which affect the situation, as, e.g., was the case in Bavaria. In former times the laws were extremely unfavorable to marriage, and a high rate of illegitimacy resulted. The rate of illegitimacy was as follows: 1865-69, 20.59 per cent, 1871-80, 12.86 per cent, 1887-91, 14.01 per cent. With the passing of more liberal marriage laws the number of marriages rapidly rose, and a corresponding fall in the number of illegitimates took place. The number of marriages increased in the period from 1840 to 1870 from 65 per 10,000 population to 81 per 10,000 population; at the same time the rate of illegitimacy fell from 20.59 per 100 births to 12.86 per 100. From this point

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there has been no considerable further decline, the rate in 1910 being 12.2.

Laws instituting an inquiry as to parentage have so far had little effect in checking illegitimacy. The following table will serve to illustrate this feature of the case.

RATE PER 1000 CHILDREN BORN, PERIOD 1878-82, STILLBIRTHS EXCLUDED

Countries where inquiry as to paternity is refused	Rate per 1000 births	Countries where inquiry is allowed	Rate per 1000 births
Belgium	77	Austria	144
France*	74	Saxony	127
Italy	73	Bavaria	132
Holland	30	Sweden	101
Russia	28	Denmark	101
		Scotland	84
		England and Wales	48
		Switzerland	47
		Ireland	25

* The inquiry as to paternity is now permitted in France, but the present percentage of illegitimacy is 8.6.

The presence in society of illegitimate children might be expected to involve serious economic and moral evils, since they are frequently deserted by their natural protectors, and since by heredity and environment they would naturally tend towards pauperism and crime. The greater death rate among this class of children diminishes these social and economic effects. The following table shows the death rate among infants under one year in each class, in the countries named.

COUNTRY	Per cent deaths among legitimates	Per cent deaths among illegitimates
Austria	24.5	33.3
France	15.5	30.0
Belgium	16.1	26.2
Norway	9.9	12.16
Prussia	19.3	34.8
Bavaria	29.3	38.6
Württemberg	29.6	36.4
Berlin	25.0	32.8

The death rate among illegitimate children in most countries is declining, but not more rapidly than the death rate among the legitimate. The best comparative study through a period of time covers the Kingdom of Saxony only (Prenger, *Die Unehelichkeit im Königreich Sachsen*, Leipzig, 1913). The following table gives the results of this study.

DEATHS OF CHILDREN UNDER ONE YEAR PER 100

	Legitimate	Illegitimate
1881-85	26.71	38.31
1886-90	26.67	39.02
1891-95	26.49	38.69
1896-1900	25.07	36.50
1901-05	23.35	32.92
1906-10	18.72	26.07

Investigations undertaken to show the physical and moral development of illegitimates are inconclusive in results. This question has been studied in Germany, and most experiments seem to show that illegitimates do not differ greatly

from the normal. For example, of 277 illegitimates examined for military service in Berlin in 1870, there were 90 accepted, of the same number of legitimates, 95 were accepted. Among criminals investigations have shown that the illegitimates furnish a large number of those arrested for theft and for begging.

An important question from the standpoint of the economist and public financier is the burden imposed by illegitimacy upon the public. It may work against the welfare of the state by unduly increasing the population, because it removes the feeling of responsibility felt by those who know they must support those whom they bring into the world. The more practical and immediate aspect of the problem, however, is the expense the state must meet in caring for the illegitimates. The importance of this item depends on three conditions: first, the actual number of those thrown on the public, second, the share of this burden borne by private charity, third, the degree of responsibility placed on the reputed parents as to the support of the illegitimate children. This leads to a detailed study of charity work, however, for which reference must be made to that head.

As to the support of illegitimates, the common-law rule is that the putative father of a bastard child is not liable for its support, this obligation falling legally on the mother.

By statute law, both in England and most of the United States, upon complaint of the mother or of certain designated public officers, an inquiry may be had as to the identity of the putative father, and upon sufficient proof an order of affiliation made whereby the father is adjudged to pay for the support of the child.

Under common law an illegitimate child can neither inherit nor transmit property. The exception to this rule is that to his own offspring he may will property of his own accumulation. Laws of the United States have modified this condition and, as a rule, allow inheritance and transmission of property through the mother.

The legitimation of children born out of wedlock by statute law in most of the States follows upon the intermarriage of the parents and acknowledgment of the children. The legitimation of illegitimates secures them, in general, all the privileges of children born in wedlock. It therefore carries with it the right of property and inheritance and the name of the father. In England the intermarriage of the parents at any time before the birth of the child legitimates the child. English law recognizes the status of the child in the place where the parents were domiciled. In the civil and canon law the intermarriage of parents has always made the child legitimate. This is the law of Scotland, Holland, Germany, and France. Consult Lefingwell, *Illegitimacy* (2d ed., New York, 1892), G. Brigida, *Del diritto gli alimenti del figlio della unione adulterina o incestuosa, in rapporto al genitore secondo il diritto civile italiano* (Naples, 1895), Paul Lafat, *La protection des enfants naturels d'après la loi du 2 juillet, 1907* (Paris, 1908), Othmar pamm, "Die Verpflegungsverhältnisse der unehelichen Kinder," in *Archiv für Sozialwissenschaft und Sozialpolitik*, vol. xxvii (Tubingen, 1908), Jean Delangre, *De la tutelle des enfants naturels* (Lille, 1909).

ILLICHPUR. See **ELLICHPUR**

ILLICIUM, il-līsh'ī-tūm (Neo-Lat., from *Lat lacere*, to allure, from *in*, in + *lacere*, to en- ce). A genus of trees and shrubs of the fam-

ily Magnoliaceae. The species are few, but very widely distributed. The most important is *Illicium anisatum*, star or Chinese anise, the fruit of which is used in medicine and as a condiment. This tree is held in high esteem by the Japanese and is planted near their temples. The star anise of commerce is now derived principally from Anam. Among the other species is *Illicium floridanum*, a shrub with dark-red flowers, a native of Alabama and western Florida, of which the leaves and capsules smell something like rosin. Similar in fragrance is *Illicium parviflorum*, another much rarer Floridian species. See **ANISE**.

ILLIGEN, él'lé'zhan', ANDRÉ (1638-70). A French buccaneer, native of Ixelles, near Brussels. From the merchant service of the Netherlands, he passed into that of the French filibuster Montbars, who had saved him from the Spaniards, and together they sacked cities and ships of the enemy. Illigen afterward worked with the famous Welsh pirate Sir Henry Morgan, with whom he cooperated during some of the latter's noted expeditions against the possessions of Spain in the West Indies and South America.

ILLIMANI, élyé-má'né. A volcano in the Bolivian Andes, South America, situated about 25 miles southeast of the city of La Paz (Map Bolivia, D 7). It is surmounted by four peaks, of which one, Condor Blanco, is over 20,800 feet high. It is covered with perpetual snow above 15,000 feet, whence its name, signifying 'snow mountain'. There is a lake in the mountain mass 15,900 feet above sea level, and glaciers on the north side at an altitude of 16,350 feet. The first ascent to the summit of one of its peaks was made in 1877 by Wiener, Grumbkow, and Ocampo, and the highest peak was ascended by Sir Martin Conway in 1898.

ILLINGTON, MARGARET (1881-). An American actress, born at Bloomington, Ill. She studied at Illinois Wesleyan University and at the Chicago Musical College. Her début was made in *The Pride of Jennico* in New York City in 1900. In 1903 she took the leading part in *The Japanese Nightingale*; and thereafter she played important rôles in various notable plays, including *The Two Orphans* (1904), *Mrs. Lefingwell's Boots* (1905), *The Lion and the Mouse*, in London (1906), *His House in Order* (1906), and *The Thief* (1907), and she starred in *Kindling* (1911-12), *Within the Law* (1913-14), and *The Lie*, by Henry Arthur Jones (1914).

ILLINOIS, il'lī-noi' or -noiz' (Amer Indian, *Illm*, men). A group of North American Indian tribes belonging to the great Algonquian linguistic family (see **ALGONQUIAN STOCK**) and originally occupying the State that received their name. La Salle speaks of Lake Michigan as Lac des Illinois. Some of the separate tribes in this group were the Cahokias, after whom the gigantic pyramidal mound opposite St. Louis was named, Kaskaskia, Michigami, Moingwena, Peoria, and Tamaroa. Most of them have left the record of their existence in place names here and there about the State.

The Illinois came early into relations with La Salle (1670-82) and the French traders. Through the influence of the Trappist monks these tribes were held loyal to the French in their wars with the neighboring tribes and afterward with the English. At the close of the Revolution the United States had great difficulty in subduing them. There are now but 128 individ-

uals passing as Peorias, residing in Oklahoma. Very little is known of their culture, but it seems to have resembled that of the Miami and Shawano.

ILLINOIS, known as the "Prairie State." A north-central State of the United States. Its location has influenced greatly its settlement and development. 1 It is between the Great Lakes and the Mississippi and Ohio rivers and has a length of 385 miles, extending from the latitude of Lynn, Mass., to that of Newport News, Va. Since American expansion has been chiefly westward, along such highways as the Great Lakes and the Ohio River, the State drew its early population from widely separated areas. Later, the waterways mentioned afforded access both to southern and eastern markets. 2 More than nine-tenths of the State is within the glaciated area. To this fact Illinois is indebted for most of its fertile soil and for the gentle topography which has made easy the building of wagon roads and railroads and the use of labor-saving farm machinery. 3 Illinois is near the centre of the humid region of the United States and has a climate highly favorable for the growth of many crops and for most human activities. These matters are far more significant than the mere fact that Illinois lies between lat 36° 59' and 42° 30' N and long 87° 35' and 91° 40' W. Area, 56,665 square miles.

Topography. Much of the State has a nearly level surface. The general slope is from northeast to south-southwest. The highest point, Charles Mound on the Wisconsin boundary, is 1257 feet above sea level, while the lowest, less than 300 feet above the sea, is at the junction of the Mississippi and Ohio rivers. The northern quarter or so has an elevation of above 700 feet, the central half between 500 and 700 feet, and the southern quarter below 500. Topographically Illinois may be divided into (1) the drift plains, whose surfaces are at about the average altitude of the State, (2) the moraine hills and ridges, which rise above the prevailing level, (3) the uplands of the unglaciated areas, in the northwest and the south, and (4) the valley floors of the larger rivers, which form lowlands distinctly below the general level.

Hydrography. Most of the large rivers of the surrounding States flow towards Illinois, a fact formerly of much economic significance. Most of the rivers rising in the State flow from moraine ridges and are tributary to the Wabash, Ohio, or Mississippi. The most important river within the State is the Illinois. It was followed by the first white men who crossed the State, it was an important highway for the fur trader, it guided thousands of emigrants into central Illinois, and it formed one of the greater commercial routes of the interior during the period of steamboat navigation. To-day the counties bordering the Illinois River and its continuation, the Illinois-Michigan Canal, contain about half the people of the State. The deposits of a tributary stream, acting as a dam, have produced the wide expansion of the middle Illinois River, known as Lake Peoria. Among the other larger rivers are the Rock, Kaskaskia, Big Muddy, and Embarras, once important as highways, they long since were abandoned by trade. Some of the rivers of Illinois are acquiring new importance in connection with the development of hydroelectric power.

Climate. The climate is little modified either by contrasts of topography or by the influence

of the Great Lakes. The State lies across the paths of many cyclonic storms, which bring it frequent and at times sudden changes of weather. Cold waves invade all parts, and high temperatures prevail in all sections for longer or shorter intervals almost every summer. The mean temperature for July ranges from 70° F in the extreme northeast to about 80° F at Cairo. The mean for January ranges from 20° F and less in the northern counties (except near Lake Michigan) to 30° F and more in the southern counties. The mean annual rainfall ranges from 43 inches at the south end of the State to 33 inches at the north end, the average for the State is about 38 inches. The precipitation is fairly well distributed in time, though severe droughts may be experienced at any time in any part. The growing season, the period between the latest and the earliest killing frosts, is about six months long at the north and about seven months long at the south.

Soils. The soils of Illinois vary greatly in fertility.

With some local exceptions, those of the younger drift sheets (in the north and northeast) are rich in mineral plant foods, for they constitute an intimate mixture of materials ground up by the ancient glaciers from many kinds of rock, and in most places they have not been injured seriously by washing and leaching. Over large areas the surface is nearly free from stones, owing to a deposit of loess or loess-like silt. The soils of the oldest drift sheet (towards the south end of the State) are of relatively inferior quality. Extensive tile drainage has been necessary on the flatish, intermoraine plains.

In the unglaciated sections the residual soils of the uplands are, as a rule, less fertile and, especially on the hill slopes, less thick than the alluvial soils of the larger valley bottoms.

Mining. No iron ore is produced in Illinois. The furnaces, located chiefly in the northern part, convenient to lake transportation, receive their supplies of ore from Lake Superior. The prominence of the State in mining is due to its large production of coal, in which Illinois is exceeded only by Pennsylvania and West Virginia. The value of coal produced considerably exceeds 50 per cent of its total mineral production. There are 102 counties in the State, and coal is mined in 50 of these. The counties credited with the largest production are in the southern and southwestern part, in the neighborhood of the city of St. Louis, although in the northern part, where the mines are close to Chicago markets, large mining operations are carried on. The reason for the larger production in the southern part of the State appears to be that the beds in that section are thicker than those worked in the northern part, and moreover the Chicago market is one which to a considerable extent is supplied by West Virginia coal, and most of the coal used in the manufacture of coke in Chicago and Joliet is from West Virginia mines. The total coal production in 1913 was 61,618,744 tons, valued at \$70,313,605, the highest production in the coal-mining history of the State, in spite of the fact that the industry has been seriously hampered in recent years by labor difficulties. The total number of men employed in the coal mines of Illinois in 1913 was 79,529, working for an average of 189 days. Nearly half the coal is mined by machines. The State is an important producer of coke, 1,859,553 short tons, valued at \$8,593,581 in 1913. At least 80 per

cent of the raw coal used in the coke ovens comes from West Virginia.

Petroleum is second in importance among the mineral products, the State ranking third in 1913 as a producer of this mineral, being the most important State in this respect east of the Mississippi River. The production in 1913 was 23,893,899 barrels, valued at \$30,971,910. Prior to 1905 the oil production of Illinois was measured by a few hundred barrels, but in the last six months of that year, owing to some developments near Casey, Clark Co., the production rose to about 180,000 barrels. Even with this there was little thought of the importance which the State would achieve as a petroleum producer. Within the three years of the extension of the oil territory, however, the production increased to over 33,000,000 barrels, and since that time it has averaged 30,000,000 barrels yearly. A decrease in the production in 1911, 1912, and 1913 gave rise to some apprehension that the standing of the State as a producer of petroleum would be short-lived. In the value of manufactured clay products, Illinois ranks fourth, with a total in 1913 of \$15,195,874. Raw material for the manufacture of these products is present everywhere. The clay-working industry is in a large measure concentrated in the vicinity of Chicago. The principal clay products are building brick, vitrified brick, architectural terra cotta, drain tile, and pottery. Other important mineral industries are cement, 4,734,540 barrels, valued in 1913 at \$4,784,696, sand and gravel, in 1913, 7,992,140 short tons, valued at \$2,070,491, stone production, in 1913, valued at \$4,140,953, and sulphuric-acid production, in 1913, 195,145 short tons, valued at \$1,303,986. The cement plants are located chiefly in the north, convenient to the Chicago market and to water transportation on Lake Michigan. The principal quarry product is limestone. Illinois ranks first among the States in the production of fluor spar, mined at Rosiclare in the south. It is second in the production of tripoli, a residual siliceous material used as a basis for abrasives and for filtration. Other mineral products are asphalt, glass sand and other sands, gravel, lead, lime, mineral paints, mineral waters, silver, and zinc. The output of pig iron in 1913 was 2,892,263 long tons, valued at \$45,796,986. In addition to pig iron, ferro-alloys, amounting in total value to over \$800,000 yearly, are made. The total value of the mineral production in 1913 was \$131,825,221.

Agriculture. A very large proportion of the total land area of Illinois is topographically suited to the best forms of agricultural occupation, while the great variety of soil and the favorable location with regard to transportation and markets have made possible a diversified and profitable agriculture. Of the entire land area, over nine-tenths is in farms, and the counties in the central and northern parts have in the greater number of cases from 90 to 95 per cent of their land in farms, and a comparatively large number have over 95 per cent. The southern counties show in frequent instances from 80 to 90 per cent of their total area in farms. The total number of all farms in the State in 1910 was 251,872. The average per farm in the same year was 129.1 acres. In 1910 the value of farm property was \$3,905,321,075, the average value of all property per farm was \$15,505, and the average value of land per acre was \$95.02.

Of the total number of farms in 1910, 147,-

493 were operated by owners and managers and 104,379 by tenants. In 1880 about 31 per cent of the farms were operated by tenants. This proportion increased during the following decades until 1910, when about 41 per cent of the farms were thus operated. Of these almost 15 per cent were operated by cash tenants and about 26 per cent by share tenants and cash-share tenants.

Of the total number of owned farms in 1910 (145,107), 86,713 were free from mortgage. The average debt per farm in the same year was \$3135, and the average equity per farm was \$9179.

Over six-sevenths of the farmers in 1910 were native whites, and nearly one-seventh were foreign-born whites. The native white farmers numbered 217,053, the foreign-born farmers 33,394, and the negro and other nonwhite farmers, 1425. Of the foreign-born white farmers, over half were born in Germany.

The table below gives the most important facts relating to the principal crops in 1914. The figures are according to estimates of the United States Department of Agriculture.

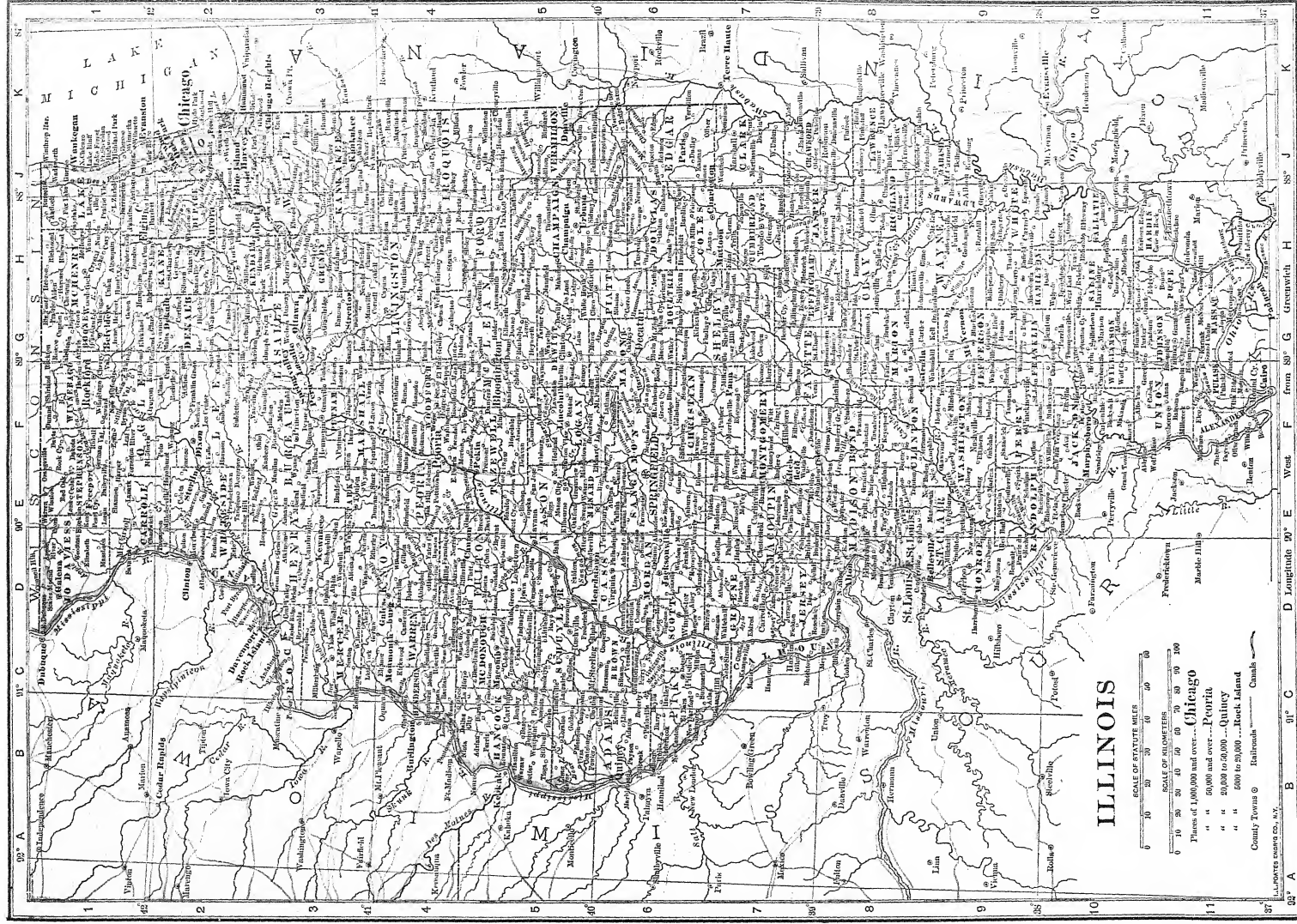
CROPS	Acreage	Prod bu	Value
Corn	10,346,000	300,034,000	\$183,021,000
Wheat	2,500,000	48,250,000	46,712,000
Oats	4,300,000	125,990,000	55,436,000
Barley	55,000	1,622,000	989,000
Rye	49,000	784,000	666,000
Potatoes	124,000	7,440,000	4,538,000
Hay	2,250,000	* 1,912,000	27,533,000
Tobacco	600	† 468,000	56,000

* Tons

† Pounds

While the production of corn is very general, the greatest acreages are in the central counties. Oats are grown throughout the State, though in very small amounts in the southern counties. Wheat is grown principally in the west and south, and showed very great increase in the western counties during the decade 1899-1909, but decreases in the acreage of this crop are found in most of the southern and for a few of the northern counties. The hay and forage acreage is very evenly distributed. Alfalfa has made little headway, although grown in almost every county. There is a considerable production of sugar beets. In 1909 the production was 14,981 pounds, with a value of \$77,732. Sorghum cane, valued at \$496,114, was produced in the same year. From this there were made 977,238 gallons of sirup, valued at \$400,569. In 1910 there were 15,033,743 fruit trees or vines of bearing age. There were produced, in 1909, 4,939,211 bushels of orchard fruits, valued at \$3,857,743. The most important of these is apples, of which 3,093,321 bushels, valued at \$2,111,866, were produced in that year. Second in importance are peaches and nectarines, the production of which in 1909 was 1,222,570 bushels, valued at \$999,516. Then follow cherries, plums, and quinces. Most parts of the State are very favorable for the production of grapes, of which the total production in 1909 was 16,532,785 pounds, valued at \$426,468.

Of small fruits there were produced, in 1909, 13,602,676 quarts, valued at \$1,109,747. The most important of these was strawberries, of which there were produced 8,031,824 quarts, valued at \$613,917. Other important small fruits are blackberries and dewberries, raspberries and



loganberries, gooseberries, currants, and cranberries. Sweet potatoes are an important crop. In 1909 the acreage of these was 10,568, the production 1,050,932 bushels, and the value \$506,760. Broom corn is also one of the most important of the minor crops, the acreage harvested in 1909 was 38,452, the production 19,309,425 pounds, and the value \$1,457,172.

Live Stock.—On Jan. 1, 1914, according to the estimates of the United States Department of Agriculture, there were in the State 2,233,000 cattle, valued at \$102,843,000, 1,497,000 horses, valued at \$169,161,000, 148,000 mules, valued at \$17,908,000, 4,358,000 swine, valued at \$47,066,000, 984,000 sheep, valued at \$4,920,000. The total number of poultry of all kinds in 1910 was 21,409,835, with a value of \$11,696,650.

Dairy Products.—In 1909, 320,440,399 gallons of milk were produced. The butter made amounted to 46,609,992 pounds, and the cheese, 81,918. Butter was valued at \$10,493,217, and cheese at \$8396. The milk sold was valued at \$18,314,172.

Forest Products. There were 54,618 farms in the State in 1909 which reported forest products. These included firewood, fencing material, logs, railroad ties, telegraph and telephone poles, materials for barrels, bark, and naval stores, with a total value of \$3,325,250. In 1909 there were 814 saw mills in the State, but the greater part of the total value of products was from the planing mills, which include establishments making sash, doors, blinds, stair work, moldings, and interior woodwork. The total value of products of these industries in 1909 was \$44,952,000.

Manufactures. Illinois is the most important manufacturing State west of the Alleghenies. It has excellent railroad facilities and has the advantages of cheap water transportation afforded by the Mississippi and its tributaries and by the Great Lakes. (See *Transportation*, below.) In 1910 there were 32 incorporated places with populations of 10,000 or over. These contained 52.3 per cent of the total population, and in 1909 had 83.1 per cent of the total value of its manufactures. The growth of the industry is shown by the fact that in 1849 there was an average of 11,559 wage earners, representing 1.4 per cent of the total population. In 1879 this had increased to an average of 144,727 wage earners, or 4.7 per cent of the total, and in 1909 to an average of 465,764 wage earners, or 8.3 per cent of the total population. The gross value of products per capita of the total population increased from \$19.42 in 1849 to \$340.38 in 1909, and the proportion which the manufactures of the State represented of the total value of the products of manufacturing industries in the United States increased from 1.6 per cent in 1849 to 9.3 per cent in 1909. In the value of its manufactures Illinois ranked fifteenth in 1849 and third in 1909. Details in regard to the most important manufactures of the State in 1904 and 1909 are shown in the table herewith. On account of the limitations of space only those industries whose product in 1909 had a value of \$10,000,000 or more are included in this table.

In 1909 there were 95 industries, or industry groups, the products of which were valued at more than \$500,000 each. These include 8 with products exceeding \$50,000,000, 8 with products between \$25,000,000 and \$50,000,000 in value, 15 with products between \$10,000,000 and \$25,000,000 in value, 17 with products between \$5,

000,000 and \$10,000,000 in value, 34 with products between \$1,000,000 and \$5,000,000 in value, and 13 with products between \$500,000 and \$1,000,000. The most important single industry in value of products is that connected with slaughtering and meat packing. In this industry Illinois held first place—the value of the output in 1909 (\$389,595,000) forming 28.4 per cent of the total for the industry in the United States. Second in value of products are those related to foundries and machine shops. Then follow the men's clothing industries and printing and publishing. Most of the clothing establishments are located in Chicago. In printing and publishing industries Illinois ranks second only to New York, and the value of the products in 1909 formed 11.8 per cent of the total for the United States. The products of iron and steel, steel works and rolling mills, ranked fifth, and the manufacture of agricultural implements sixth, in point of value. In 1909 Illinois contributed \$38,300,000, or 9.8 per cent of the total value of products for all blast furnaces in the country. The manufacture of wire is a very important branch of the iron and steel industry. Illinois has always been the leading State in the manufacture of agricultural implements and in 1909 manufactured 39.1 per cent of the total value of these products for the United States. The growth in the manufacture of automobiles from 1904 to 1909 is remarkable. The total number of persons engaged in manufactures during 1909 was 561,044, of whom 465,764 were wage earners. In all the manufacturing industries combined, 82.2 per cent of the average number in 1909 were males 16 years of age and over, 16.3 per cent were females 16 years of age and over, and 1.5 per cent were children under the age of 16. The men's clothing industry employed more women than any other industry, and together with women's clothing and men's furnishings-goods industries employed nearly one-third of the total number of female wage earners 16 years of age and over. Other industries employing large numbers of female wage earners are printing and publishing, slaughtering and meat packing, and the manufacture of clocks and watches, millinery and lace goods, electrical machinery, tobacco products, and fancy and paper goods. Of the wage earners under 16 years of age, the larger number were employed in the men's clothing industry, printing and publishing, the manufacture of fancy and paper boxes, boot and shoe industry, the manufacture of pianos and organs, the confectionery industry, and in the foundry and machine shops.

In 1909, 69.5 per cent of the establishments were located in cities having a population of 10,000 and over. Of the value of products, 83.1 per cent was produced in incorporated places having over 10,000 inhabitants. Of the total number of wage earners employed in 1909, 63.1 per cent were in Chicago, and 66.8 per cent of the total value of products was produced in that city. For details in regard to manufacturing industries of Chicago, see CHICAGO, and for industries relating to other cities in Illinois, see separate titles.

In all industries 28.9 per cent were under corporate ownership in 1909. Establishments owned by corporations produced 85.8 per cent of the total value of products in 1909, establishments under firm ownership represented only 16.5 per cent of the total number in 1909.

The total figures for manufactures presented

COMPARATIVE SUMMARY FOR 1909 AND 1904

THE STATE—ALL INDUSTRIES COMBINED AND SELECTED INDUSTRIES

INDUSTRY	Cen- sus	Num- ber of estab- lish- ments	PERSONS ENGAGED IN INDUSTRY				Capital	Wages	Value of products	Value added by manu- facture
			Total	Pro- pri- etors and firm mem- bers	Salar- ied em- ploy- ees	Wage earners (aver- age num- ber)				
All industries	1909	18,026	561,044	17,357	77,923	465,764	\$1,548,171	\$273,319	\$1,919,277	\$758,350
	1904	14,921	447,947	13,990	54,521	379,436	975,845	208,405	1,410,342	570,285
Agricultural implements	1909	79	21,511	48	2,223	19,240	110,605	11,718	57,268	32,444
	1904	82	17,331	43	1,929	15,359	71,383	8,861	38,412	20,661
Boots and shoes, including out stock and findings	1909	53	6,392	38	562	5,792	7,570	3,143	18,755	5,886
	1904	52	4,587	41	297	4,249	3,945	1,991	9,993	3,578
Bread and other bakery products	1909	2,099	12,566	2,409	1,546	8,611	24,224	5,495	36,118	14,512
	1904	1,406	9,632	1,512	705	7,415	13,515	4,115	26,145	11,866
Butter, cheese, and condensed milk	1909	295	3,000	896	372	1,732	7,820	942	17,798	3,531
	1904	403	2,302	272	295	1,735	5,322	829	13,277	2,568
Carriages and wagons and materials	1909	325	6,746	349	545	5,852	17,859	3,588	16,831	7,352
	1904	324	5,981	361	465	5,155	12,005	2,778	11,392	5,046
Cars and general shop con- struction and repairs by steam-railroad companies	1909	73	24,406		1,275	23,131	18,722	15,288	32,229	16,996
	1904	99	20,232		1,137	19,095	13,242	12,105	25,491	13,223
Cars, steam-railroad, not in- cluding operations of rail- road companies	1909	28	11,732	2	835	10,945	37,935	7,824	27,001	11,665
	1904	16	9,666	2	628	9,036	15,467	5,931	30,926	9,753
Clothing, men's, including shirts	1909	715	41,122	861	4,109	36,152	38,763	16,580	89,473	44,245
	1904	624	25,063	746	2,962	21,355	19,724	10,215	57,002	28,976
Clothing, women's	1909	221	7,279	267	861	6,151	5,567	3,152	16,635	7,421
	1904	191	5,664	256	718	4,690	3,558	2,198	12,237	5,904
Coffee and spice, roasting and grinding	1909	35	1,792	23	751	1,018	8,752	525	19,751	4,637
	1904	25	1,361	22	386	953	6,488	432	15,745	3,262
Confectionery	1909	140	4,622	112	711	3,799	6,094	1,429	12,798	5,133
	1904	87	4,115	67	461	3,587	3,704	1,170	7,646	3,444
Copper, tin, and sheet-iron products	1909	483	8,897	508	916	7,473	31,018	4,315	22,823	9,630
	1904	283	6,472	305	522	5,645	27,378	2,968	15,385	6,590
Electrical machinery, apparat- us, and supplies	1909	143	11,854	55	2,158	9,641	24,202	6,413	26,826	13,198
	1904	104	7,808	46	1,631	6,131	21,645	3,203	16,700	9,051
Flour-mill and gristmill prod- ucts	1909	461	3,634	544	626	2,464	18,454	1,271	51,111	5,521
	1904	363	3,287	412	465	2,410	14,128	1,211	30,892	4,962
Foundry and machine-shop products	1909	1,178	61,303	700	8,337	52,266	143,277	33,157	138,579	74,769
	1904	*947	48,912	639	5,644	42,629	95,618	25,425	94,917	55,156
Furniture and refrigerators	1909	267	15,240	300	1,365	13,575	22,383	8,100	27,900	15,399
	1904	207	13,638	141	1,071	12,426	17,027	6,714	22,395	12,731
Gas, illuminating and heating	1909	78	8,020	12	1,717	6,301	131,790	2,967	21,052	14,842
	1904	64	4,069	10	1,095	2,964	97,119	1,695	16,008	11,489
Iron and steel, blast furnaces	1909	6	2,927	434		2,493	52,390	1,793	38,300	7,392
	1904	4	1,993	83		1,910	14,263	1,398	27,331	8,326
Iron and steel, steel works and rolling mills	1909	24	19,437	3	1,850	17,584	69,682	12,962	86,608	30,364
	1904	23	17,718	3	1,267	16,448	44,276	10,071	60,022	21,372
Leather, tanned, curried, and finished	1909	29	3,194	26	167	3,001	15,975	1,582	14,912	2,781
	1904	28	2,887	20	97	2,770	11,649	1,326	10,768	2,584
Liquors, distilled	1909	9	851	1	100	750	7,500	479	55,200	45,991
	1904	11	762	3	67	692	5,456	407	54,102	47,696
Liquors, malt	1909	106	5,361	25	938	4,398	56,141	3,473	28,449	21,416
	1904	116	4,861	51	777	4,033	39,003	3,004	23,787	18,516
Lumber and timber products	1909	814	19,025	825	1,633	18,567	29,778	9,110	44,952	17,688
	1904	591	16,909	611	1,172	15,126	21,651	7,424	32,741	14,519
Musical instruments, pianos and organs and materials	1909	68	9,628	18	833	8,777	27,719	5,009	19,176	10,534
	1904	56	8,265	18	739	7,508	16,471	3,932	13,323	7,925
Paint and varnish	1909	74	2,906	31	1,083	1,792	15,725	1,114	20,434	7,532
	1904	63	1,979	19	684	1,276	11,340	771	13,325	4,669
Patent medicines and com- pounds and druggists' prepa- rations	1909	359	3,902	249	1,784	1,869	7,989	805	13,114	8,701
	1904	312	3,428	237	1,823	1,868	7,062	818	13,320	9,582
Printing and publishing	1909	2,608	43,074	2,384	12,046	28,644	60,084	18,437	87,247	62,567
	1904	2,414	32,909	2,232	7,859	22,818	41,880	13,883	62,292	45,258
Slaughtering and meat pack- ing	1909	109	32,642	93	5,844	26,705	131,026	14,602	389,595	45,619
	1904	95	32,356	99	5,646	27,111	80,733	14,658	318,201	37,609
Soap	1909	34	3,408	20	1,200	2,188	11,694	1,053	20,181	6,233
	1904	34	2,497	24	568	1,905	7,604	887	14,157	4,612
Stoves and furnaces, includ- ing gas and oil stoves	1909	71	5,223	28	696	4,499	9,863	2,957	10,287	6,431
	1904	60	4,360	25	417	3,908	7,543	2,358	7,867	5,052
Tobacco manufactures	1909	1,944	10,707	2,127	546	8,034	12,794	4,216	21,870	13,267
	1904	1,825	9,874	2,032	371	7,471	9,102	3,738	16,062	10,067

* Excluding statistics for two establishments, to avoid disclosure of individual operations

herewith do not include the statistics for an establishment operated by the Federal government—the arsenal at Rock Island. In 1909 this plant employed an average of 1698 wage earners, and the value of its products, which consisted of infantry, cavalry, and artillery equipment, was \$3,114,338.

Transportation. Many trunk lines, both between the East and West and between the North and South, enter or pass through Illinois, and nearly every county is traversed by one or more railroads running into Chicago or St. Louis. On Jan. 30, 1909, there were 150 railroad companies having lines through the State. In that year Illinois had approximately 12,000 miles of main track of steam railroad, an average of over 21 miles for every 100 square miles of territory, and also 2700 miles of electric railroads. In addition to these ample railroad facilities the State has the advantage of cheap water transportation afforded by the Mississippi River and its navigable tributaries and by the Great Lakes. The total mileage of main lines on June 30, 1913, was 12,168. There were in addition 3024 miles of additional main tracks, 563 miles of industrial tracks, and 7496 miles of yard tracks and sidings, or a total of 23,252 miles. There were in the same year 1544 miles of surface and elevated electric railways. This includes only main lines. There were also 213 miles of additional main tracks, 33 miles of industrial tracks, and 139 miles of yard tracks and sidings, making a total electric mileage of 930. In railway mileage Illinois exceeds every other State except Texas. In 1907 a canal was completed by the United States government from Hennepin to Rock River. This, together with the Illinois and Michigan Canal at La Salle, completed in 1848, provides an improved waterway from Chicago to the Mississippi River. In 1908 a bond issue to the amount of \$20,000,000 was authorized to provide for making a canal as far as the city of Utica, on the Illinois River, and for connecting this with the Chicago Sanitary District at Joliet. (For an account of the transportation facilities of Chicago, see CHICAGO.) A railway and warehouse commission has general charge of the railways with authority to fix freight and passenger rates. This commission was established in 1871 and is the oldest commission of the sort in the United States. The laws governing this commission were amended in 1911, and its powers were increased. The United States government is making improvements in several rivers.

Banks. There were in Illinois, on June 4, 1913, 459 national banks, with a capital of \$75,777,000 and deposits of \$863,142,000, 697 State banks, with deposits subject to check amounting to \$89,009,781 and savings deposits of \$76,289,250, 53 loan and trust companies, with deposits subject to check amounting to \$85,329,102 and savings deposits of \$216,644,432, and 235 private banks with deposits subject to check of \$17,513,737 and savings deposits of \$9,139,065.

Finance. Receipts from all sources and disbursements from Oct. 1, 1912, to Sept. 30, 1914, amounted to \$39,708,784 and \$32,952,862 respectively. There was a balance at the end of the period of \$12,255,132. The chief sources of revenue are State taxes, the inheritance tax, the Illinois Central Railroad, and fees collected by the different State departments. The chief expenditures are for the National Guard, the University of Illinois, normal schools, charitable and penal institutions, the salaries of officers

and employees, and members of the Legislature. The bonded debt of the State was \$17,500.

Government. The State has been governed under three constitutions. The first became operative when Illinois was admitted to the Union in 1818, the second was ratified by the people in 1848, and the third and present constitution in 1870. It has been several times amended since its adoption. A convention for amending or revising the constitution may be called upon the concurrence of a two-thirds majority of each House submitting the question of whether such convention shall be held to the electors, who shall decide, by a majority vote, whether a convention shall be held. If the proposal is accepted by the electors the General Assembly shall at the next session provide for a convention to consist of double the number of members in the Senate. This convention must within three months after the election prepare such revision, alteration, or amendments of the constitution as shall be deemed necessary. These amendments are then submitted to the electors for their ratification or rejection at an election appointed by the convention for that purpose, not less than two nor more than six months after the adjournment. Amendments may also be proposed in either House of the General Assembly, and if they shall be voted for by two-thirds of all the members elected to each of the two Houses, such proposed amendments shall be submitted to the electors at the next election. The General Assembly may not propose amendments to more than one article of the constitution at the same session nor to the same article more than once in four years.

Legislative.—Legislative power is vested in a General Assembly, which consists of a Senate and House of Representatives. Elections for members are held biennially on the first Tuesday after the first Monday in November. A senator must be 25 years of age and a representative 21 years of age. The State is divided into 51 senatorial districts, each of which elects one senator, whose term of office is four years. The General Assembly apportions the State every 10 years in accordance with the results of the Federal census. The result is divided by 51, and the quotient obtained is the ratio of representation in the Senate. Each senatorial district elects three representatives to serve for a term of two years. In all elections of representatives each qualified voter may cast as many votes for one candidate as there are representatives to be elected, or may distribute the same, or equal parts thereof, among the candidates, as he shall see fit, and the candidates highest in number of votes shall be declared elected. This provision of the constitution is designed to secure minority representation. The legislators receive \$2000 each for the two years for which they are elected. The General Assembly may not pass local or special laws for granting divorces, regulating county or township affairs, regulating the practice in courts of impeachment, regulating the practice in courts of justice, or granting to any corporation, association, or individual any special or exclusive privilege, immunity, or franchise. The House of Representatives has the sole power of impeachment, and all impeachments are tried by the Senate.

Executive.—The executive department of the government consists of a Governor, Lieutenant Governor, Secretary of State, Auditor of Public Accounts, Treasurer, Superintendent of Public

Instruction, and Attorney-General These, with the exception of the Treasurer, hold office for four years, from the second Monday of January next after election. They must, except the Lieutenant Governor, reside at the seat of government during their term of office. The Treasurer holds office for two years and until his successor is elected and qualified. He is ineligible to the office for two years next after the end of the term for which he was elected. No person is eligible to the office of Governor or Lieutenant Governor who has not attained the age of 30 years and who has not been for the five years immediately preceding his election a citizen of the State. The Governor has the usual veto power over legislative measures. The Lieutenant Governor is President of the Senate.

Judiciary—Judicial power is vested in a supreme court, circuit courts, appellate courts, county courts, probate courts, and such courts as may be created by law in and for cities and incorporated towns. The supreme court consists of seven judges, one of whom shall be chief justice. Four of these constitute a quorum, and a concurrence of four is necessary to every decision. The State is divided into seven districts, in each of which a judge of the supreme court is elected for a term of nine years. The State, exclusive of Cook County and other counties having a population of 100,000 or over, is divided into judicial circuits. For each of these three judges are elected for a term of six years. The circuit courts have original jurisdiction of all cases in law and equity and such appellate jurisdiction as is or may be provided by law. They are required to hold two or more terms each year in every county. Inferior appellate courts, of uniform organization and jurisdiction, may be created in districts formed for that purpose. In these courts such appeals and writs of error as the General Assembly may provide may be prosecuted from circuit and other courts. Appellate courts are held by such number of judges of the circuit courts and at such times and places and in such manner as may be provided by law. One judge is elected for each county. County courts are courts of record and have original jurisdiction in all matters of probate, settlement of estates of deceased persons, and such other jurisdiction as may be provided by general law. Cook County, which comprises the city of Chicago, forms one judicial district. The courts of Cook County consist of 14 judges of the Circuit Court of Cook County, one of whom is chief justice, and 18 judges of the superior court of Cook County. These are all elected for six years.

Suffrage and Elections—Persons who have resided in the State for one year, in the county 90 days, and in the election district 30 days immediately preceding any election therein, and those who were electors in the State on the first day of April, 1848, or obtained a certificate of naturalization before any court of record in the State prior to the first day of January, 1870, or those who are male citizens of the United States above the age of 21 years, are qualified voters. The Legislature of 1913 passed a measure giving to all women who are citizens of the United States and 21 years old the right to vote for nominees for all offices created by statute. Its limitations prevent women from voting for governor, United States senators, representatives in Congress, members of the Legislature, nearly all judges, and limits the voting privilege to the presidential electors, university trustees, and

various county, township, and municipal officers. This measure was upheld as valid by the Supreme Court of the State in 1914. The Legislature in special session in 1910 passed acts providing for primary elections. Three primary laws passed prior to that year had been declared unconstitutional by the State court. The first of these measures, passed in 1910, was a general act to provide for the holding of primary elections by political parties, and the second provided for the holding of primary elections for the nomination of members of the General Assembly and the election of senatorial committeemen. By provisions of the general act a political party which at the general election for State and county officers next preceding a primary polled more than 2 per cent of the entire vote cast is declared to be a political party within the State and may nominate all candidates provided for in the act. Primary elections are held for the nomination of all candidates for State, congressional, senatorial, county, town, city, or village officers, and for the election of precinct, ward, and State central committeemen, and delegates and alternate delegates to national nominating conventions. The act does not apply to nominations of candidates for election of President and Vice President of the United States, trustees of the State University, school or township officers. All conventions are held on the first Friday after the first Monday next succeeding the September primary. The convention of each political party has power to make nominations for presidential electors and trustees of the University of Illinois. It may also adopt a party platform.

The primary to nominate candidates for State, congressional, senatorial, and county officers to be elected on the first Tuesday after the first Monday in November is held on the first Wednesday after the second Tuesday in September. The Legislature of 1913 amended the measures relating to elections so as to bring them into conformation with the Seventeenth Amendment of the United States Constitution, providing for the direct election of senators. In every year in which a President of the United States is to be elected, a primary is held on the second Tuesday in April to nominate delegates and alternate delegates to national nominating conventions and for the purpose of securing an expression of the sentiment and will of the voters in respect to candidates for the nomination for President. This is the presidential primary and provides that the vote of the State at large is to be considered advisory to delegates at large to conventions, and the vote of each congressional district is considered to be advisory to delegates of the district. Candidates for United States senator are included as "State officers" and are nominated at the September primary in the same manner as other State officers.

Local and Municipal Government—The General Assembly provides for township organization under which any county may organize whenever a majority of the legal voters voting at any general election shall so determine. Each county has a board of commissioners. The county affairs of Cook County, which includes Chicago, are managed by a board of commissioners of 15 persons, 10 of whom are elected from the city of Chicago and 5 persons from outside that city. The officials include a county judge, county clerk, sheriff, and treasurer. The Legislature of 1910 passed a measure providing for a commission

form of government in towns and cities, by the terms of which all cities and villages not exceeding 200,000 in population have the power to adopt a commission form of government. Whenever the electors of such city or village equal in number to one-tenth of the votes cast for all candidates for mayor or president of the board of trustees at the last preceding election shall petition the judge of the circuit court of the county to submit to a vote of the electors of the city or village the proposition as to whether it shall adopt and become entitled to the provisions of the act, it is the duty of the judge of the court to submit such a proposition at a special city or village election to be held within 60 days. The measure includes provisions for the recall of elective officers and for the initiative and referendum. By the provisions of the general election law, on a written petition signed by 25 per cent of the registered voters of any incorporated town, village, city, township, county, or school district, or 10 per cent of the registered voters of the State, it shall be the duty of the proper election officers in each case to submit any questions of public policy so petitioned for to the electors of such incorporated towns, villages, etc., at any general or special election named in the petition. Not more than three propositions shall be submitted at the same election, and these propositions must be submitted in the order of their filing.

Other Constitutional and Statutory Provisions—No corporation may be created by special laws, or its charter extended, changed, or amended, except those for charitable, educational, penal, or reformatory purposes. It is unlawful for commissioners of any penitentiary or other reformatory institutions to let by contract to any person or persons or corporations the labor of any convict confined within the institutions. There is a pure-food law conforming in its chief features to the national law, administered under the supervision of the State Food Commissioner. There is a stringent workmen's compensation law, applying to certain dangerous industries only. Physicians are required to report cases of occupational diseases, and employers must arrange for the examination by a licensed physician, once every calendar month, of all employees in dangerous processes likely to result in such diseases. A State mining board composed of five members has charge of the administration of the coal-mining laws. The Legislature of 1913 passed a measure providing for mothers' pensions and for the municipal ownership of public utilities. The State is under a system of local option for the control of liquor traffic. At the end of 1913 the following cities with a population of 5000 or more were under "no license": Champaign, Evanston, Jacksonville, Oak Park, Paris, Rockford, Urbana, and Zion City. The proportion of the population under "no license" on that date was 33 per cent. The local-option law, which was enacted in 1907, provides for a vote on the liquor question in townships, villages, and cities. Drinking and drunkenness on railroad trains and interurban cars are prohibited. The Legislature of 1913 passed a 4-mile dry-zone bill which makes it impossible for saloons to be located within 4 miles of the State University at Champaign and Urbana.

Militia. The total number of males of militia age in 1910 was 1,330,556. The organization consists of a first, second, and third brigade of infantry, the first regiment of cavalry, the first

battalion of field artillery, a company of engineers, a company of signal troops, and a company of sanitary troops. There are five regiments of 12 companies each, one regiment of 12 companies, one machine-gun platoon, and two regiments of 11 companies each. The cavalry regiment consists of nine troops, and the field artillery consists of one battalion and three batteries. The total number of enlisted men on Jan. 1, 1913, was 5408. The officers numbered 506.

Population. The population by decades has been as follows: 1810, 12,282; 1820, 55,211; 1830, 157,445; 1840, 476,183; 1850, 851,470; 1860, 1,711,951; 1870, 2,539,891; 1880, 3,077,871; 1890, 3,816,351; 1900, 4,821,550; 1910, 5,638,591. The estimated population on July 1, 1914, was 5,986,781. The population per square mile in 1910 was 100.6. In 1910 the population in places of 2500 or more was 3,476,929, or 61.7 per cent. The rural population in 1910 was 2,161,662. The white population in 1910 numbered 5,526,962, and the negroes numbered 109,049. The whites of native parentage in 1910 numbered 2,600,555. The native whites of foreign or mixed parentage numbered 1,723,847. The foreign-born whites numbered 1,202,560. Germans are most numerous among both the foreign-born whites and native whites of foreign parentage. The State was divided by sex in 1910 between 2,911,674 males and 2,726,917 females. The males of voting age numbered 1,743,182.

In 1910 there were 12 cities with a population of 25,000 or over. The populations of these in 1910 were as follows: Chicago, 2,185,283; Peoria, 66,950; East St. Louis, 58,547; Springfield, 51,678; Rockford, 45,401; Quincy, 36,587; Joliet, 34,670; Decatur, 31,140; Aurora, 29,807; Danville, 27,871; Elgin, 25,976; Bloomington, 25,768. The estimated population of Chicago on July 1, 1914, was 2,393,325.

Religion. Estimated upon the reported number of Church communicants, the Methodists about equal the Roman Catholics in their adherents. The Baptists, Disciples of Christ, Presbyterians, German Evangelicals, Congregationalists, Lutherans (General Council), and Protestant Episcopalians follow in importance in the order named.

Education. The free-school system of Illinois dates from 1855, and progress has been made in perfecting it, especially in lengthening the school year. According to the thirteenth census, the school population, ages 6 to 20, was 1,615,914, the average number in school attendance was 1,025,053, out of a total population of 10 years old or over (4,493,734), only 168,294, or 3.7 per cent, were illiterate. Illiterates among the native whites numbered only 40,486, or 1.3 per cent, and among foreign-born whites, 117,751, or 10.1 per cent. Among the negroes illiterates numbered 9713, with a percentage of 10.5. On June 30, 1913, the school population, ages 6 to 21, was, according to the report of the State Superintendent of Public Instruction, 1,582,180, the enrollment was 1,010,215. There were employed 5609 men teachers and 24,956 women teachers, making a total of 30,565 teachers. The average annual wages paid to men teachers was \$772.07 and to women teachers \$643.70. The amount expended for all school purposes in 1913 was \$37,923,943. In 1912 there were 671 high schools, in which were enrolled 71,577 secondary students, of these, 65 schools were in cities of 4000 population. There were in addition 91 private high schools and

academies The Legislature of 1911 increased the school fund from \$1,000,000 to \$2,000,000, and the Legislature of 1913 made another addition of \$1,000,000 to this fund The same Legislature passed a certificating bill which placed Illinois in the front rank in this respect A free high-school tuition act was passed at this session, as was a law permitting local school boards to levy 2 instead of 1½ per cent for operating expenses, when authorized by the people A position of high-school inspector with a salary of \$4000 a year was created Boards of education are authorized to establish and maintain classes for the deaf, dumb, and blind, and for delinquent children, the State to pay the excess cost The Legislature of 1911 authorized the boards of education in districts having more than 1000 and less than 100,000 inhabitants to establish and maintain a fund for the retirement of teachers upon an assessment basis

The normal schools are as follows Southern Illinois State Normal University at Carbondale, Eastern Illinois State Normal School at Charleston, Chicago Normal School at Chicago, Northern Illinois State Normal School at DeKalb, Western Illinois State Normal School at Macomb, and the Illinois State Normal University at Normal Summer schools are maintained at the normal schools and at many other schools There are 33 institutions of collegiate rank Of these the most important are the University of Chicago at Chicago, the University of Illinois at Champaign and Urbana, the Armour Institute of Technology at Chicago, Northwestern University at Evanston, Knox College at Galesburg, Illinois College at Jacksonville, Illinois Women's College at Jacksonville, Lake Forest College at Lake Forest, Illinois Wesleyan University at Bloomington, James Millikin University at Decatur, and Loyola and De Paul universities (both Roman Catholic) at Chicago

Charities and Corrections As a result of a campaign conducted by the State Board of Charities, a law was passed in 1905 which placed the employees of the State charitable and correctional institutions, with a few exceptions, under the State civil-service law In 1906 the system of medical administration in State institutions was completely modernized and made uniform, and a State Psychopathic Institute was established to teach physicians in the service and for carrying on research work in the treatment and causes of insanity In 1909 the Legislature passed a new charities administration law, which centralized administration of all institutions in one board, composed of five members A centralized system of inspection, criticism, and recommendation by the board, known as the Charities Commission, made up of five nonsalaried members, was also put into effect This body is in no way responsible for administration and is therefore free to criticize the executive branch of the service The inspectional and critical service is extended beyond the central Charities Commission into the several institutions in the form of a nonpaid board of visitors for each, and the service is still further extended to each county almshouse and jail in the form of county auxiliary boards—one for each county, each having three members The board of visitors and the county auxiliary boards must report to the Charities Commission This measure contains every advanced idea in the administration of public charities that up to that time had been tried successfully in other States, especially in

the treatment of the insane, and is unique among American public-charity statutes Some of the names of the institutions were changed by the new law so as to eliminate the words "insane," "feeble-minded," "asylum," from the legal nomenclature This measure went into effect on Jan. 1, 1910 The Legislature of 1911 made an appropriation for the construction of a new hospital for the insane at Chicago, for the erection of a surgical institute for crippled children, \$10,000 for the visitation and education of the adult blind in their own homes, and for the State Psychopathic Institute, which enabled it to complete its equipment and staff, which included a director, an assistant, a chemist, a pathologist, and a bacteriologist In the same year plans were completed for a new prison at Joliet to cost in the neighborhood of \$7,000,000 In 1912 all the insane in the county farms or rural communities were removed to State hospitals, and in the same year the State took over the Dunning County Hospital for the Insane with 2700 patients One division of the State Charities Commission is a bureau of criminal statistics which collects annually statistics of crime The counties are authorized to pay pensions to needy widows with dependent children There has been a juvenile-court law in existence since 1899, and this has produced excellent results, especially in Chicago (See JUVENILE COURTS) The charitable and correctional institutions include the Lincoln State School and Colony at Lincoln, the Soldiers' Orphans' Home at Normal, the Kankakee State Hospital at Kankakee, the Dunning State Hospital at Chicago, the Soldiers' Home at Quincy, the Anna State Hospital at Anna, the Jacksonville State Hospital at Jacksonville, the Elgin State Hospital at Elgin, the Chester State Hospital at Chester, the Industrial Home for the Blind at Chicago, the Eye and Ear Infirmary at Chicago, the Watertown State Hospital at Watertown, the State Training School for Girls at Geneva, the St Charles School for Boys at St Charles, the Soldiers' Widows' Home at Wilmington, and the Peoria State Hospital at Peoria The Alton State Hospital at Alton and the Colony for Epileptics were created by the Legislature of 1913 The total population of these institutions on June 30, 1913, was 19,816, and the total appropriations for the two years beginning July 1, 1913, was approximately \$13,000,000 for maintenance, improvement, and extension The correctional institutions are the State prisons at Joliet and Chester and the State Reformatory for Boys at Pontiac

History In 1673 Father Marquette ascended the Illinois River and two years later established a Jesuit mission at the Indian village of Kaskaskia La Salle entered the river in 1679, named it Illinois from the tribes inhabiting the region, and built Fort Crèvecoeur at the foot of what is now called Lake Peoria His explorations were continued by Tonty, whom he left behind in 1680 when he returned to Canada Fort St Louis on Starved Rock was built in 1682, and between 1683 and 1690 French traders established themselves at Kaskaskia, Cahokia, and other Indian villages, though the actual settlement of Kaskaskia, the oldest town in Illinois, probably did not occur before 1700 By 1751 there were six important settlements within the present limits of the State The French showed a remarkable aptitude for controlling the Indians and adapting themselves to their mode

of life Inter-marriage between French and Indians was common, and ties of friendship were established which lasted after the power of France had passed away Pontiac's rising prevented the English for two years from taking possession of the Illinois country ceded to them in 1763 In general, conditions remained unaltered after the English occupation, but many prominent French settlers fled from English rule to St Louis, Natchez, and other towns in the valley of the Mississippi In 1778-79 a force of Virginians under George Rogers Clark (qv) captured Kaskaskia and subdued the province Virginia ceded its claims to the southern part of the region in 1784, Massachusetts and Connecticut gave up their rights in the following year, and in 1787 the region became a part of the Northwest Territory Ohio was set off in 1800, Indiana in 1802, and Michigan in 1805, what remained was organized as Illinois Territory on Feb 3, 1809 The hostility of the Indians prevented rapid settlement in the north On Aug 15, 1812, the garrison at Fort Dearborn (Chicago) was massacred On Aug 18, 1818, the first constitution was adopted On December 3 Illinois was admitted into the Union with boundaries so extended to the north as to include the port of Chicago By 1805 most of the Indian titles to land within the Territory had been extinguished There ensued a period of wild land speculation, marked by stupendous frauds The early immigrants, who came chiefly from the South, brought with them a decided predilection for slavery The first Legislature passed stringent laws to protect the few slaveholders in the State, and from 1818 to 1865 a harsh code of antinegro laws, known as the Black Laws, was in force In 1824 an attempt was made to call a convention for the purpose of legalizing slavery in spite of the Ordinance of 1787, but the project was quickly and definitely defeated The murder of Elijah P Lovejoy (qv) at Alton in 1837, however, showed the persistence of a strong proslavery sentiment After 1820 the people were hurried into an unhealthy state of precarious prosperity Banks were established at Edwardsville and Shawneetown entirely on paper credit, and an elaborate system of internal improvements was begun As the northern part of the State after the Black Hawk War began to fill up with immigrants from New England and the Middle States, the process of economic development was accelerated The Illinois and Michigan Canal was begun in 1834 and was built with the proceeds of the sale of public lands granted by Congress The inception of other public improvements was followed by a panic in 1842, when the State bank suspended specie payments The people, however, recovered quickly, and in 1850 Congress made an extensive cession of public lands to aid in the construction of the Illinois Central Railroad, an enterprise which contributed greatly to the development of the State In 1840 the Mormons, who had immigrated from Missouri and founded Nauvoo, began to figure in the politics of Illinois Welcomed at first, they became in the course of a very few years obnoxious to the mass of the inhabitants Acting as a unit, under autocratic direction, they succeeded in obtaining exclusive privileges from the Legislature Their religious practices jarred with the feelings of their neighbors, they were inclined to look upon Gentiles with superciliousness, they were prosperous Bitter feelings led to hostile action in 1844, when

Joseph Smith, founder of the sect, while in prison at Carthage on the charge of treason, was murdered by a mob In the following year the Mormons left Illinois In 1858 occurred the great contest for the United States senatorship between Abraham Lincoln and Stephen A Douglas At the outbreak of the Civil War Illinois was in an extremely prosperous condition It produced three-fifths of all the grain exported to Europe and was the second State in the Union in railway mileage During the war the State readily furnished its quota of troops, sending 260,000 men into the field In peace its prosperous development continued In 1865 Chicago had become the leading live-stock market of the world and a great grain centre Legislation between 1865 and 1885 was largely concerned with corporations and especially with the railroad companies The constitution of 1870, replacing the one adopted in 1849, forbade the creation of corporations by special law A State board of railroad commissioners was created to protect the interests of the State against the railway companies, and the Legislature frequently attempted to fix a maximum for transportation and to prevent discrimination in rates Between 1872 and 1875 the farmers of Illinois participated in the widespread Granger movement of the time (See GRANGER) On Oct 8-10, 1871, a fire laid waste a large part of Chicago and rendered 100,000 people homeless The loss to the city was estimated at nearly \$300,000,000 The action of the mayor in calling in the Federal troops to preserve order during the excitement following the calamity occasioned a bitter dispute between that official and the Governor of the State, who showed himself jealous for the honor of the civil authority A general feeling of unrest found expression in 1885 and 1886 in bitter strikes and bloody riots, in Chicago there were serious riots, during which bombs, killing several people, were thrown In 1893 the Columbian Exposition was held in Chicago In 1894 a strike of the employees of the Pullman Palace Car Company developed into a general strike of railway men Traffic in Illinois was almost suspended, and in June lawlessness broke out Interference with the United States mails led to the intervention of the Federal government Chicago was occupied by the Federal troops, the leaders of the strikers were arrested on civil process and sentenced to short terms of imprisonment for contempt of court The backbone of the strike was thus broken In national politics Illinois was Democratic before 1860 In that year it cast its vote for Lincoln, and from that time it has been consistently Republican with the exception of 1892, when it voted for Grover Cleveland, and 1912, when its vote was cast for Wilson In State politics the year 1857 marks the beginning of Republican ascendancy In the latter part of the first decade of the twentieth century political interest was largely centred in efforts to change the laws relating to elections From 1907 to 1910 the Legislature was occupied in attempting to pass a primary election law which the Supreme Court of the State would allow to stand (See *Suffrage and Elections*, above) In the national election in 1908 Illinois, on account of divisions in the Republican party, was among the doubtful States, but it was carried by Taft by a vote of 629,932 to 450,810 for Bryan For Governor, Deneen, Republican, received 550,076 votes, and Stevenson, Democrat, 526,912 On account of the lack of plurality of votes by any

candidate for the United States Senate it was necessary for the Legislature when it convened in January, 1909, to elect a Senator. There were several candidates, the most prominent of whom was Albert J. Hopkins, who made a strong fight for reelection. After a deadlock which lasted from Jan. 19 to May 26, 1909, William Lorimer, a Representative in Congress at that time, was elected Senator by a coalition of Democratic and Republican votes. This ended one of the most stubborn political struggles in the history of the country. It was, however, but the beginning of an even more serious situation. Lorimer had for many years been one of the strongest figures in Illinois politics and was generally considered to be the chief Republican "boss" of Chicago. In April, 1910, a Chicago newspaper published what purported to be a confession of a Democratic member of the House, in which it was charged that Lorimer had been elected by the wholesale bribery of Democratic legislators. As a result of investigations into the facts alleged in this confession, many prominent members of the Legislature were indicted by a grand jury. On May 28, 1910, Senator Lorimer defended himself in a long speech in the Senate, in this he denounced the alleged confession as false. He asked for an investigation, and a committee was at once appointed by the Senate to make an examination into the facts alleged. On Dec. 12, 1910, a majority of the committee made a report exonerating Lorimer. A minority report was filed by Senator Beveridge, of Indiana. In this he claimed that the charges were abundantly proved. Senator Beveridge also introduced a resolution declaring Lorimer's seat vacant on account of corruption in his election. A vote was had in the Senate in March, 1911, and by 46 to 40 its members refused to unseat him. In the meantime the State Legislature had taken action, and another investigation was authorized in January, 1911. This produced new and even more startling testimony of corruption and bribery. A resolution was adopted requesting the Senate to reopen the investigation, and on June 1 the Committee on Privileges and Elections was so authorized, and a subcommittee to take testimony was appointed on June 5, 1911. Hearings on the evidence were carried on for nearly a year. On May 20, 1912, a majority of the committee reported that the hearing had produced no new evidence of value. The minority members, however, declared that the new evidence showed conclusively that Senator Lorimer had been elected through corrupt practices. A vote was taken in the Senate on July 13, 1912, and by 58 to 28 the Senators adopted a resolution declaring that corrupt methods and practices had been employed in the election of William Lorimer and that his election was therefore invalid. This vote was preceded by a remarkable debate of seven days, three of which were occupied by Mr. Lorimer himself, who spoke in his own defense. This action left the State of Illinois with but one representative in the Senate chamber.

Senator Cullom, although 84 years of age, was a candidate for reelection in 1912, opposed to Lawrence Y. Sherman, a well-known Republican lawyer. At a special session of the Legislature a presidential primary election was authorized on March 30, 1912, and at this election voters cast their ballots also for candidates for the Senate. In this election Roosevelt received 226,917 votes, Taft, 127,487, La Follette, 42,692. Champ

Clark received a plurality of the Democratic votes. For candidate for the Senate, Senator Cullom was defeated by Sherman. Governor Deneen was renominated by the Republicans, and E. F. Dunne by the Democrats. In the presidential election on Nov. 5, 1912, Wilson received 405,048 votes, Roosevelt, 386,478, Taft, 253,593, and Debs, Socialist, 81,278. For Governor, Dunne received 443,120 votes, Deneen, 318,469, Funk, Progressive, 303,401. The Democrats elected 19 out of 25 representatives to Congress. Among the prominent Congressmen defeated were Joseph G. Cannon, Speaker of the House, and William B. McKinley, who had charge of President Taft's campaign. The Legislature elected included 97 Democrats, 76 Republicans, 27 Progressives, and 4 Socialists. The balance of power for the election of United States Senator was therefore in the hands of the Progressives and Socialists. When the Legislature convened in January, 1913, there was a deadlock in the election of officers which lasted from January 1 to the last week in that month. It was ended by the election of a Speaker by a combination of Democratic and Republican votes. Another deadlock resulted from the attempt to elect two United States Senators—one to succeed Senator Cullom and the other as a successor to Senator Lorimer. A compromise was finally arranged on March 26 by which James Hamilton Lewis, Democrat, was elected for the term of six years from March 4, 1913, and Lawrence Y. Sherman, Republican, was elected for the unexpired portion of the term left vacant by the exclusion of Mr. Lorimer. The State election of 1914 centred about the choice of a United States Senator. Senator Sherman was reelected, defeating Mr. Sullivan in a close contest.

The first elections in the State in which women participated were municipal and were held in 1914. In a number of smaller cities women officials were elected, but all the women candidates for aldermen in Chicago were defeated. Local-option elections were held on the same date, and it was in the voting on this question that the influence of women voters was most potent. No-license advocates gained a number of the larger cities. By the apportionment of 1910 the State has 27 members in the national House of Representatives, prior to that year it had 25.

The Governors of the State have been

TERRITORIAL

Ninian Edwards	1809-18
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STATE

Shadrach Bond	Democrat	1818-22
Edward Coles	"	1822-26
Ninian Edwards	"	1826-30
John Reynolds	"	1830-34
Joseph Duncan	"	1834-38
Thomas Carlin	"	1838-42
Thomas Ford	"	1842-46
Augustus C. French	"	1846-53
Joel A. Matteson	"	1853-57
William H. Russell	Republican	1857-60
John Wood	"	1860-61
Richard Yates	"	1861-65
Richard J. Oglesby	"	1865-69
John M. Palmer	"	1869-73
Richard J. Oglesby	"	1873
John L. Beveridge	"	1873-77
Shelby M. Cullom	"	1877-83
John M. Hamilton	"	1883-85
Richard J. Oglesby	"	1885-89
Joseph W. Rifer	"	1889-93
John Peter Altgeld	Democrat	1893-97
John Riley Tanner	Republican	1897-1901
Richard Yates	"	1901-05
Charles S. Deneen	"	1905-13
Edward F. Dunne	Democrat	1913-

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ILLINOIS, UNIVERSITY OF The State University of Illinois, occupying a site of 610 acres, between the cities of Urbana and Champaign, was chartered in 1867 as the Illinois Industrial University and assumed its present name in 1885. In 1870 women were admitted as students and now form about one-fifth of the whole attendance. The university comprises the colleges of liberal arts and sciences, engineering, agriculture, law, medicine, and dentistry, and the schools of library science, music, education, pharmacy, and the graduate school. The State laboratory of natural history and the United States agricultural experiment station, the engineering experiment station, the State geological and water surveys, and the State entomological office are connected with the university. The schools of pharmacy, medicine, and dentistry are situated in Chicago. The university owns valuable collections in zoology, botany, entomology, geology, and other departments. The library contains 310,000 volumes. The university holds a summer session of eight weeks, primarily for teachers. It maintains close relations with the high schools of the State through a careful system of inspection and accrediting. It has developed rapidly and is constantly engaged in scientific investigations bearing upon the interests of the State. In 1914 it had 45 buildings, 704 instructors, and about 5500 students, of whom about 800 were in attendance at the Chicago departments. At the same time its endowment amounted to \$647,000, its buildings and grounds were valued at \$3,000,000, and its annual income, mainly derived from legislative appropriations, was \$2,775,000. The General Assembly of Illinois in 1911 established a tax of one mill on the assessed valuation of the taxable property of the State to be set apart as a fund for the maintenance of the university. The president in 1914 was E J James, Ph D, LL D. Consult E E Slosson, *Great American Universities* (New York, 1910).

ILLINOIS AND MICHIGAN CANAL See CANAL

ILLINOIS COLLEGE The oldest collegiate institution of Illinois, founded in 1829 at Jacksonville, Ill., in part through the efforts of an Eastern organization known as the Yale Band. The curriculum is arranged on the "major" system, with elective courses mainly after the freshman year, and leads to the bachelor's and master's degrees. The college had, in 1913-14, 131 collegiate, 189 music, 11 art, and 60 preparatory students, and 26 instructors. At the same time the value of its grounds and buildings was

\$315,290, and its endowment \$386,700. The library contains about 14,000 volumes, with about 4000 volumes in the libraries of the literary societies. The president in 1914 was C H Rammelkamp, Ph D.

ILLINOIS INDIANS See ILLINOIS, 1

ILLINOIS RIVER The most important tributary of the upper Mississippi, traversing the State of Illinois (Map Illinois, F 4). It is formed by the junction of the Des Plaines and the Kankakee in Grundy Co., Ill., about 45 miles southwest of Chicago. It flows generally southwest, joining the Mississippi about 24 miles above the mouth of the Missouri. Its length is 500 miles and its drainage area 29,013 square miles, of which 24,726 square miles lie in Illinois and the remainder in Indiana and Wisconsin. It is broad and deep, and navigable for steamers 250 miles, to La Salle, whence a ship canal connects it with the south branch of the Chicago River (qv), thus affording uninterrupted water communication between the Great Lakes and the Mississippi. The chief cities on the river are Ottawa and Peoria.

ILLINOIS STATE NORMAL UNIVERSITY An institution for normal and higher education, founded in 1857 at Normal, Ill. The institution undertakes to prepare every sort of teacher required by the public-school system of Illinois and therefore offers a great variety of courses in accord with the statutes of the State for the certification of teachers. The programmes of study offered are for prospective country teachers, upper-grade teachers, intermediate teachers, kindergarten-primary teachers, and special teachers of music, art, manual training, domestic science, domestic art, agriculture, and commercial branches. A four-year programme is offered for high-school teachers, superintendents, and others requiring a longer preparation. The degree of bachelor of education is conferred upon students who complete the full four-year course. This is the oldest normal school in the Mississippi valley. The school is in session 48 weeks in the year. It is claimed that this school has contributed a larger number of prominent men and women to the educational forces of this generation than has any other school of like character in America. The attendance in 1914 was about 3036, and the faculty numbered about 80. The library contains about 30,000 volumes. The president in 1914 was David Feimley, LL D.

ILLINOIS WESLEYAN UNIVERSITY A Methodist Episcopal college at Bloomington, Ill. It was founded in 1850 and comprises a preparatory school, a college of letters (embodying the elective system), and schools of law, music, and oratory. The degrees conferred in course are B A, B S, LL B, and the honorary degrees D D and LL D. The total number of students enrolled in the university in 1913 was 688, of whom 235 were collegiate students. At the same time the faculty numbered 42 instructors. The library contains some 8000 volumes. The university has an endowment of \$350,000, and grounds and buildings valued at \$175,000. The president in 1914 was Theodore Kemp, D D.

ILLITERACY (from Lat. *illiteratus*, uneducated, from *in-*, not + *litteratus*, educated, from *littera*, *littera*, letter). Inability to read and write one's own language. As used in the United States census, the term is used also of those who can read but not write.

There are several methods of determining the

percentage of illiterates, and unfortunately the various nations follow different plans. Some statisticians prefer to base their estimates on the number of applicants for marriage licenses who cannot sign their names. Most of the European countries find the percentage from the examinations of the recruits for the army and navy, thus confining the test to men of a certain age. In the United States the census makes inquiry of each person and takes his or her word, there being no test of any sort. In all countries children under a certain age are not included, as it is not expected that they should know how to read and write. The age taken naturally affects the percentage. The United States does not count children under 10, Italy fixes the age at six. Naturally, the country which best enforces compulsory school attendance will show the lowest percentage.

The report of the United States Commissioner of Education for 1900 contains the following table for the different countries:

	Per cent		Per cent
Germany	0.11	Hungary	28.10
Switzerland	0.30	Greece	30.00
Scotland	3.57	Italy	38.30
Holland	4.00	Russia	61.70
France	4.90	Spain	68.10
England	5.80	Portugal	79.00
Belgium	12.80	Servia	86.00
Ireland	17.00	Rumania	89.00
Austria	23.80		

According to the census of 1910 illiterates in the United States numbered 5,516,163, or 7.7 per cent of the population 10 years of age and older. We may compare this percentage with 14.1 for France (1904), 12.7 for Belgium (1910), 17.4 for Ireland (1901), 22.6 for Austria (1900), 40.9 for Hungary (12 years and over, in 1900), 57.2 per cent for Greece (1907), 48.2 per cent for Italy (1901), 70 per cent for Russia (1907), 73.4 per cent for Portugal and 78.9 per cent for Servia (1900), 65.5 per cent for Bulgaria (1905). Methods of attaining the foregoing percentages differ so widely for the several countries that comparison is on an insecure basis. It is none the less certain that the problem of illiteracy is far from solution in southern and eastern Europe—the chief source of recent emigration to America.

Of the illiterates in the United States, 28 per cent were native whites, 30 per cent foreign-born whites, 40 per cent negroes, and 2 per cent Indians, Chinese, Japanese, etc. Illiteracy is chiefly characteristic of rural territory. 4.8 per cent of the native whites in rural territory were illiterate, 0.8 per cent in urban communities. Of the rural negro population, 40 per cent were illiterate, of the urban negro population, 17.6.

From the following table it will appear that illiteracy is largely indicative of lack of educational opportunities in earlier decades of our history. The percentage of illiteracy increases regularly with advancing years.

YEARS	Percentage of illiterates in total population in age group	Percentage of illiterates among whites in age group	Percentage of illiterates among negroes in age group
10-14	4.1	1.8	18.9
15-19	4.9	2.8	20.3
20-24	6.9	4.6	23.9
25-34	7.3	5.2	24.4
35-44	8.1	5.4	27.7
45-54	10.7	6.7	52.7
65-	14.5	9.4	74.5

There were 2,273,603 illiterate males 21 years of age and over. Of these, 617,733 were native-born whites, 788,631 foreign-born whites, and 819,135 negroes. In percentages, illiterate males 21 years and over represented 4.1 per cent of the native born, 11.9 per cent of the foreign born, 33.7 per cent of the negroes. The potential political significance of illiteracy is indicated by the following table for cities having 8 per cent and upward of illiterate males of voting age.

CITY	Per cent of illiterates in population 10 years and upward	Per cent of illiterates in male population 21 years and upward
Fall River	13.2	15.6
Birmingham	10.4	10.7
Scranton	8.9	12.2
Nashville	8.8	9.4
Atlanta	8.6	8.1
Richmond	8.2	8.6

Of the six cities in the foregoing table, the high percentage of illiteracy in Birmingham, Nashville, Atlanta, and Richmond is due to the presence of a large negro population. In the case of Fall River and Scranton it is due to the high proportion of foreign born.

Illiteracy in the five largest cities is indicated by the following table.

CITY	Per cent of illiterates in population 10 years and upward	Per cent of illiterates in male population 21 years and upward
New York	6.7	6.4
Chicago	4.5	5.1
Philadelphia	4.6	4.7
Boston	4.4	4.5
St. Louis	3.7	4.1

Cities having less than 2 per cent illiteracy in the population 10 years and over are given in the following table. It is noteworthy that all are on the Pacific coast, where the negro and low-grade foreign population is at a minimum.

CITY	Per cent of illiterates in population 10 years and upward	Per cent of illiterates in male population 21 years and upward
Seattle	1.1	1.4
Portland	1.2	1.3
Spokane	1.3	1.8
Los Angeles	1.9	2.0

The States having the lowest percentage of illiteracy in the population of 10 years and over are Iowa (1.7), Nebraska (1.9), Oregon (1.9), Washington (2.0), Kansas (2.2), Idaho (2.2), Utah (2.5), South Dakota (2.9). The States having the highest percentages are Louisiana (29.0), South Carolina (25.7), Alabama (22.9), Mississippi (22.4), Arizona (20.0), New Mexico (20.2). The high percentages in the case of Arizona and New Mexico are explained by the presence of a large Mexican population. In the other cases it is explained mainly by the large negro population. The native white population shows a percentage of illiteracy of 5 and above in Florida, Mississippi, West Virginia, Arkansas, Georgia, Virginia, Tennessee, Alabama, Kentucky, the Carolinas, Louisiana, and New Mexico.

Until recently it has been assumed that no

effective means could be devised to reduce illiteracy among the adult population, that the percentage could be lowered only through the supplanting of the older generations by the more literate younger generations. A number of experiments have shown that there is no insuperable difficulty in teaching illiterate adults to read and write. One of the most interesting of these experiments was conducted by Superintendent of Schools Mrs. Cora Wilson Stewart in Rowan Co., Ky. In night schools organized in that county one-third of the whole adult population was enrolled and a majority were redeemed from illiteracy. Equally good results have been attained among the illiterate foreign born in some of the large cities. Consult *Census of the United States* (1900 and 1910), *Annual Reports of the Commissioner of Education* (Washington), *Illiteracy in the United States* (Bulletin No. 20 of the United States Bureau of Education, Washington, 1913), reports of ministers and departments of education of various European countries. See IMMIGRATION.

ILLUMINATED DOCTOR, THE (Lat. *Doctor Illuminatus*). A title given to Raymond Lully and to Johann Tauler (qq.v.).

ILLUMINATED MANUSCRIPTS Those adorned with figures, letters, and other designs in color and gold. Such decorations are called illuminations—a term originally used in connection with book ornamentation of the later Middle Ages, but its use has been extended to the embellishment of manuscripts in general. The term *miniature* is often used indiscriminately to designate illuminations as well as minute painting on ivory or other material, but the best usage restricts it to the last-named subject. (See *MINIATURE*.) Illuminations consist chiefly of large ornate initials, marginal drawings and borders, and illustrations of figures and incidents. In the early Middle Ages the painter of the scriptoria of the monasteries was usually called the *pictor*. The Egyptian papyri of the ritualistic class, as old as the eighteenth dynasty, especially the *Book of the Dead*, are ornamented with vignettes or miniatures, attached to the chapters, either designed in black outlines or painted in primary colors in tempera. Except these papyri, no other manuscripts of antiquity were, strictly speaking, illuminated, such Greek and Roman ones of the first century as have reached the present day being written only. Pliny, indeed, mentions from Varro that authors had their portraits painted on their works, and mentions a biographical work with numerous portraits introduced, but all such have disappeared in the wreck of ages, the oldest illuminated manuscripts which have survived dating from the fourth century. St. Jerome complains of the abuse of the practice, as shown by filling up books with capital letters of preposterous size. The art of illuminating manuscripts with gold and silver letters is supposed to have been derived from Egypt, but it is remarkable that no papyrus has any gold or silver introduced into it. The artists who painted in gold, called *chrysographi*, are mentioned as early as the second century. There were, in fact from the beginning two distinct classes of illuminated manuscripts (1) those with decorative letters and (2) those with figured compositions. These were often crossed, and figures painted within and around the letters. The purely figured illustrations, similar to the larger compositions in mosaic and fresco, originated in

early Byzantine art, and the decorative letter style was a specialty of the northern races, especially Irish and Saxon. One of the oldest manuscripts of this style is the *Codex Argenteus* of Ulfilas (c. 500 A.D.), and the charter of King Edgar (966 A.D.) shows the use of these letters. The principal late Roman illustrated manuscripts are the two *Vergils* of the Vatican, the *Iliad* of the Ambrosian (Milan), and the *Roman Philocalian Calendar* at Vienna, all belonging to the fourth century or the early part of the fifth, and illustrating the last phase of the secular school. There exist also a few copies of originals of this date or earlier, such as the Terence plays at the Vatican and Bibliothèque Nationale and the *Calendar of Aratus* at Boulogne. Of Greek classic descent are the exquisite pictures in the Viennese manuscript of the medical writings of Dioscorides, not executed till 505 A.D.

Early Byzantine. In the Eastern Empire, during the fifth and sixth centuries, illuminating became one of the most important branches of Christian art and remained so until the sixteenth century. With an innate talent for color born of the Orient, the Byzantines, while retaining a free, rather classic drawing, used brighter colors and applied gold more freely than had hitherto been done. Manuscripts of the Old Testament, either as a whole or in separate books, and Gospel manuscripts were systematically searched for incidents of historic or religious importance. At first there was even a superabundance of pictures, as in the roll of Joshua at the Vatican, and, though less so, in the fifth-century codices of Genesis at Vienna and the British Museum. The normal type was given at this time by the *Rossano Gospels*, a work of the Byzantine school which was creating the new art. In the teaching of the people by pictures it is difficult to decide which branch of art gave the suggestive types for the scenes—the illuminators or the mosaicists and fresco painters. Outside of the Bible the chief work is the manuscript of Cosmas Indicopleustes at the Vatican, with its 54 pictures of the sixth century. Until the seventh century the illuminations were square or oblong pictures interrupting the text, but at that time the calligraphic style of decoration began, with its initial letters and its interweaving of human, animal, and geometric forms with the letters. Already in the famous Syriac manuscript at the Laurentian Library (Florence) this decorative sense had shown itself. It was developed by the Byzantine artists of the Iconoclastic age, who preferred ornamentation to the human figure, and by the Irish and Anglo-Saxon schools, which showed an originality and boldness in decorative design equal to their ineptitude in treating the figure.

The Irish school was essentially a native product, developed without foreign influence, in the monasteries of Ireland during the seventh century, whence it was transplanted to Scotland and England. In England the style was continued by later monks, though modified by Byzantine and later by Carolingian influences. The Irish style broke away entirely not only from all classic traditions but from all naturalism. Spirals, knots, bands, zigzags, and other geometric forms, derived largely from metal work, were interwoven often with fantastic beasts and impossible men. The colors are harmonious and rich as enamel, and in pure Irish

work no gold is used. The *Book of Deer*, the Dorbeei *Life of Columba*, the *Lindisfarne Gospels*, the *Book of Kells*, the *St Gall Gospels*, the *Wurzburg Epistles*, the *Utrecht Psalter*, are among the finest works of this school.

Carolingian. Meanwhile in the West the Benedictine monks of the sixth and seventh centuries had continued the degenerate Roman style, as in the Pentateuch of Tours, or were copying Byzantine models, as in the *Cambridge Gospels*. The prominence of Irish and Anglo-Saxon monks in the missionary and educational worlds in the eighth century throughout northern Europe made them the teachers of the Carolingian school of illuminators that sprang up in France and Germany. This school, while adopting much of the decorative scheme, including the immense and highly ornamental initial letters of the Irish, added the use of sacred compositions with the human figure, largely from Latin or Byzantine models. Rich architectural details are used to frame the scenes, and large single figures of Christ, the Emperor, the Evangelists, etc., prevail. The backgrounds are not gilt, but plain or broken up by accessories. The Gospel book of Charlemagne from Soissons (Bibliothèque Nationale, Paris) is dated 781 and is one of the earliest and finest works of the school. It had several branches. In France were (1) the Franco-Saxon branch, extending from Paris to the Rhine, of which over 30 examples remain, including the Gospels at Arras, the *Psalter* at Vienna, and the above Gospels from Soissons, (2) the branch of Tours, founded by Alcuin, illustrated by Bibles and Gospels, in the British Museum, belonging to Alcuin, Charles the Bald, and Lothair, (3) the branch of Orléans, with Bibles at the Bibliothèque Nationale and Le Puy. In Germany were (1) the branch at Metz, to which the Sacramentary of Drogo belongs, and (2) that at St Gall, which has specimens in the Munich Library. In these Carolingian works the colored outline drawing was brilliant rather than solid, the figures clumsy and inclined to overaction. But the general effect was of splendor and originality.

Romanesque. The true continuators of the Carolingian style in the Romanesque period were the German illuminators of the time of the Otthos and the Henrys, who tempered the earlier exaggerations of movement and size through contact with Byzantine art. Both the Rhenish and the Saxon schools, especially the latter, have left many works executed for these emperors, now preserved at Bamberg, Munich, Trier, Paris, etc., especially Gospel books. The architectural details and borders are particularly good and rich, including also the animals and birds so frequent in Romanesque art. Body colors, usually light in tone, replaced the Carolingian outline style, figures were better drawn and more dignified. In the eleventh century the richness of initials and backgrounds increased, often with tapestry effects as in the *Regensburg Gospels*, but there came a decadence, which lasted nearly up to the Gothic period.

Meanwhile other countries were lagging far behind. In France the Carolingian methods became crude and barbarous, as in the *Noailles Bible*. Italy had never even participated in the Carolingian revival and confined itself to clumsy figure painting, mostly in outline, without displaying any decorative ability. The English school contained the older Irish and Anglo-

Saxon work with modifications first due to Carolingian influence, as in *Æthelwold's Benedictional*. With the Conquest, however, the body-color technique replaced the outlined work, as in Germany.

Late Byzantine. The ninth, tenth, and eleventh centuries were the golden age of Byzantine illuminations. Under the Macedonian dynasty (867-1057) there was a return to more classic models, to figure painting in place of the decorative work of the Iconoclastic age. The famous *Paris Psalter* has scenes of antique grace showing a copying of very early models, but even works of purely contemporary art, like the Paris sermons of Gregory of Nazianzus, show an understanding of form and drapery denied to Western art. The brilliant gold grounds, the rich solid coloring, the simplicity of composition and ornament, belong to a severer style. One of the most extensive series of pictures is contained in the *Menologium* of Emperor Basil II (976-1025) in the Vatican. The decline is heralded in the Paris *Homilies of St John Chrysostom* illuminated for Nicephorus III (1078-81), and is quite evident from about 1100. In the two following centuries the figures lose all semblance to life, and the artists turned to decorative work and initials.

Gothic. While Byzantine illumination was dying, the golden age of the art in Europe was beginning, at the close of the twelfth century. First Germany and then France take the lead. The *Hortus Deliciarum* of Herrad of Landsberg, a sort of cyclopædia in design, was a forerunner of Gothic design, whose first steps are shown by Landgrave Hermann's *Psalter*. It was under St Louis (1226-70) in France, however, that the Gothic style of illumination really originated and developed. The lingering influence of Byzantine art is shown in the clear outlines, the solid strong coloring, the small-sized figures, the simplicity of accessories, and the good taste shown in every particular. Of course the ornaments and other details were adapted from the Gothic style of architecture, with growing realism in the use of plants and flowers. A *Psalter* of St Louis is the earliest masterpiece of the type so familiar to the strong style of stained-glass windows. In the course of the fourteenth century a lighter scheme was introduced, with delicate shading instead of flat tints, with more detail and expression. This French-Gothic school was extremely systematic in its use of subjects—in this as in the larger arts—and it originated the type of the *Bible Historiée*, corresponding to the German *Biblia Pauperum*, with its great wealth of illustrations. The other main class of religious illuminated manuscripts was the *Books of Hours*, or prayer book. Such works, executed for the use of royal and feudal personages, were the most exquisite products of the school. But the field of subjects was immeasurably enlarged beyond the religious sphere, which had hitherto reigned alone. Works of poetry and legend, of history and literature of every kind, were decorated as a matter of course with illuminations.

Other countries followed in the wake of France, adopting her Gothic style in this as in other branches of art. Still, though England, Germany, and the Netherlands had flourishing schools, there was a lack of originality and less perfection of design and color.

In France itself the latter part of the fourteenth century saw a further approach to the

methods of naturalistic painting. Exquisite borders of elaborate floral patterns commonly inclosed the entire page, often enlivened by little birds, animals, and figures. Contemporary costume, furniture, and other accessories are reproduced with minute fidelity. Brushwork is evident in the modeling, and faces are exquisitely treated. Work in monochrome, in the light *grisaille*, and in *camaiieu* became popular. The libraries of King Charles V and of the dukes of Berry, Anjou, and Burgundy were enriched with many illuminated manuscripts, often by court illuminators—missals, gospels, psalters, breviaries, books of hours, romances, poems, treatises on falconry, jousting, astronomy, physics. The number of illuminations in some of these works can be judged by the fact that a Bible done for the Duke of Burgundy contained over 2500 pictures. The great public and private collections testify to the enormous productivity of the French schools during the latter part of the thirteenth and the whole of the fourteenth century.

It was at this time that two influences are noticeable, that of Italy and that of Flanders. The Italian Giottoesque revival extended to illumination, and Giotto's contemporary, the Sienese master Simone Memmi, executed illustrations to Vergil and to Petrarca in a simple broad style, imported from wall painting, which henceforth characterized Italian illuminating. The manuscript statutes of the Order of the Holy Ghost illustrate the development of this school. When the popes established themselves at Avignon, the Italian miniaturists with them began to influence the French artists. On the other hand, the powerful school of Flanders began to dominate French art on the northern side, in this as in other branches, with tendency to heaviness, realism, and portraiture, especially remarkable in the following century.

The fifteenth century still belongs to the golden age in the West. In France, except for a few exceptional men who adopted the Renaissance style, led by Fouquet, the Gothic manner still ruled supreme. Here it was the feudal nobles and the royal family, and not the churches or monasteries, for whom nearly all the masterpieces were executed. The *Books of Hours*, or prayer books, were especially beautiful. Those of Philip the Good of Burgundy, at The Hague, and those of Charles the Bold and Mary of Burgundy, at Vienna, are typical of Flemish art, which was taking the lead in powerful naturalism. The *Breviary* of the Duke of Bedford (c 1430) shows Franco-Flemish art in the service of England. The *Hours* executed for Chevalier and the *Jewish Antiquities* of Josephus are among the masterpieces of Fouquet, even more great as a painter than miniaturist, who combined the pure Italian Renaissance with North French realism. In Bohemia also the art was royally patronized by Emperor Charles IV and his son Wenceslas, while King Matthias Corvinus of Hungary helped develop the genius of some of the greatest Italian miniaturists.

Renaissance. Italy forged to the front during this century. The Sforzas at Milan, the dukes of Ferrara, the royal house of Naples, the Medici at Florence, were the greatest patrons besides the cathedral churches. The cathedral of Siena still has the finest collection of illuminated missals and choir books decorated by Liberale da Verona, Girolamo da Cremona, Francesco di Lorenzo, Roselli, and other leading

artists. But the greatest of all artists was Attavante (qv), some of whose work can be seen at Florence (in the cathedral), beside that of Gherardo, of Strozzi, the pupil of Fra Angelico, and others. Some of Attavante's greatest masterpieces were executed for Matthias Corvinus (eg, Missal of 1485-87). This Italian school did not aim at the delicate French effects. It remained broader, preferred to use large capital letters to frame its compositions, aimed at simplicity of composition with few figures.

The invention of printing, while it limited the scope of illumination by greatly diminishing the demand for manuscripts, did not at once give it its death blow. Printed books were often at first illuminated with initials or pictures added by hand in spaces left for them—a practice that lasted even into the first decade of the sixteenth century. Quite as fatal was the introduction of foreign methods into the art, borrowed from fresco and oil painting. The old simplicity and aloofness from naturalism gave way to attempts at effects that were totally foreign to the true spirit of illumination—shading and delicacy of coloring, imitation of natural objects, importance given to perspective and accessories. Prominent among the works of the old school is the somewhat earlier *Grimani Breviary* (c 1477) in Venice, so long ascribed to Memling. A remarkable facsimile of this great work was printed in Germany in 1900. In France the famous Missal of Anne of Brittany (1508, St Petersburg Library) is the expiring effort of the national school, which was succeeded by the Italian masters of the Fontainebleau group. The breaking down of the technical differences between the larger forms of painting and illumination was at this time helped by the work of such artists as Fra Bartolommeo, who practiced both branches. A few works of rare beauty and workmanship continued, however, to be produced, like the *Books of Hours* by Giulio Clovio (qv), of which a fine example is in the library of J P Morgan, New York. Henceforth illumination ceased to count in the history of art. In the reign of Louis XIV the art became extinct, ending in the style called *camaiieu gris*, a kind of monochrome in which the lights are white or gold and shaded so as to emulate bas-reliefs.

Oriental. Among Oriental nations the Persians, Hindus, and Chinese have illuminated manuscripts of great beauty, with figured compositions. The branches of Mohammedan art stricter than the Persians have confined their illuminations to ornamental work, as in the mediæval works of the schools of Cairo and Damascus, mainly represented by magnificent Korans. The best works were produced during the comparatively brief period between the thirteenth and sixteenth centuries, described under INDIAN ART; MOHAMMEDAN ART, ETC.

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for the Byzantine Kondakov, *Histoire de l'art byzantin, considéré principalement dans les miniatures* (ib., 1886-91). For Irish and Anglo-Saxon Westwood, *Facsimiles of the Miniatures and Ornaments of the Anglo-Saxon and Irish Manuscripts* (London, 1868), an admirable monograph with excellent facsimiles. For the French Martin, *Les peintres des manuscrits et la miniature en France* (Paris, 1909), Vogelstein, *Von französischer Buchmalerei* (Munich, 1911). For the English Bernard Quaritch, *Examples of the Art of Book Illustration* (4 vols., London, 1889), E. M. Thompson, *English Illuminated Manuscripts* (ib., 1895), Heibert, in the work cited above. *Historical Introduction to the Collection of Illuminated Letters and Borders in the National Art Museum*, published by the Victoria and Albert Museum (ib., 1901), *Catalogue of the John Pierpont Morgan Collection of Manuscripts and Early Printed Books* (4 vols., ib., 1906-07). Many of the important manuscripts have been published in facsimile by the Vatican Library, the British Paleographical Society, in the Leyden series of facsimiles, and by other societies and private publishers. Facsimiles of illuminations from various sources are published in such works as De Bastard, *Peintures et ornements des manuscrits* (1832-69), Shaw and Madden, *Illuminated Ornaments from Manuscripts and Early Printed Works* (London, 1833), Tikanen, *Die Psalter-Illustrationen im Mittelalter* (Helsingfors, 1895 et seq.), Kobell, *Kunstvolle Miniaturen und Initialen aus Handschriften des 4 bis 16 Jahrhunderts* (2d ed., Munich, 1892), G. E. Warner, *Illuminated Manuscripts in the British Museum* (London, 1903), the *Facsimiles of the Paleographical Society* and the *New Paleographical Society* (London, 1903 et seq.), *Collezione paleografia Vaticana* (Rome, 1905 et seq.). For the technical side, consult Merrifield, *Original Treatises Dating from the Twelfth to the Eighteenth Centuries on the Art of Painting* (London, 1849), Audsley, *Guide to the Art of Illuminating and Missal Painting* (ib., 1862), Johnston, *Writing and Illuminating and Lettering* (ib., 1908). See MANUSCRIPTS, ILLUMINATED.

ILLUMINATI (Lat nom pl., enlightened). A name which has been borne by four different societies. 1 The earliest was that of the Alombrados in Spain, followers of a seductive mysticism, said to have had Gnostic elements. It first appeared in 1492 and spread rapidly through Spain about the middle of the sixteenth century, though vigorously combated by the apostle of Andalusia, John of Avila, and by Ignatius Loyola. About 1625 it was spreading in France, where it was suppressed in 1635. It was finally suppressed by the Inquisition, though it lingered until the middle of the seventeenth century and had a few scattered followers even at the beginning of the eighteenth. Consult Pelayo, *Historia de los heterodoxos españoles* (Madrid, 1880). 2 A group of enthusiasts and visionaries, known as *Guérinets*, in France about 1684. 3 An association of mystics in Belgium in the latter half of the eighteenth century. 4 A society to which the name is now most commonly applied, the Order of the Illuminati, which was founded at Ingolstadt on May 1, 1776, and soon spread over almost all the Roman Catholic parts of Germany. Its founder at first called it the Order of the Perfectionists. It owed its existence to Adam Weishaupt, professor of canon law at Ingolstadt—a man of

superior abilities and much benevolence, but deficient in practical knowledge of mankind. Impatient of the slow advance of human progress, he conceived the idea of forming an association which should consist of the choicest spirits, labor for the establishment of the dominion of reason, and promote religious and political enlightenment and emancipation. Religious dogmas and forms of worship were to be rejected, a system of deism was to be propagated together with republican opinions. The accession of Baron von Knigge to the new order, and the support which it received from the Freemasons, led to its rapid extension. Weishaupt's knowledge of the Order of the Jesuits, whose pupil he had been, led him to borrow some of the methods of organization which had proved so successful in their hands for building up a strong and united system, especially the absolute obedience of superiors. His arrangements were calculated to place the threads all in one hand by which the holy legion was to be led on, as it was imagined, to the benefaction of mankind, but from this cause the dissolution of the order soon ensued. Weishaupt and Knigge, its two leaders, quarreled with one another. The order began to be openly denounced as dangerous, and on June 22, 1784, an edict was issued by the Elector of Bavaria for its suppression, which was followed by others (March 2, 1785) of a more drastic character, and under the prosecution ensuing the order was suppressed. Weishaupt was removed from his professorship. He returned to Gotha, where he was received and died as court counselor, in 1830, at the age of 82. Various other members were severely punished, and the form of justice was not strictly observed in the proceedings against them. Great importance was at one time attached to the Order of the Illuminati, whose secret influence was regarded, incorrectly, as a principal cause of many of the political events of the time of the French Revolution. The Bavarian government published confiscated documents in 1787. Consult Adam Weishaupt, *Das verbesserte System der Illuminaten mit allen seinen Einrichtungen und Garden* (Frankfurt, 1787), Kloss, *Bibliographie der Freimaurerei und der mit ihr in Verbindung gesetzten geheimen Gesellschaften* (Frankfurt, 1844), Engel, *Geschichte des Illuminaten Ordens* (Berlin, 1906).

ILLUMINATING See ILLUMINATED MANUSCRIPTS.

ILLUMINATING ENGINEERING SOCIETY See ILLUMINATION.

ILLUMINATING GAS See GAS, ILLUMINATING AND FUEL.

ILLUMINATION. The use and arrangement of sources of light so as to render objects readily visible, with due consideration to available facilities and proper economy. The extreme brightness of modern illuminants is recognized, not only on account of the inartistic effects due to uneven illumination of surfaces, but also for the injurious influence on the human eye. Modern illumination is concerned chiefly with the various forms of electric and gas lamps in use, such as the electric incandescent and arc lights and gas burners of the mantle type. (See ELECTRIC LIGHTING, GAS.) For interior lighting, the past few years have seen the rapid displacement of carbon filament incandescent lamps by those of tungsten, and of open-flame gas burners by incandescent mantle lamps, whereby the same or a greater amount of light is secured

at a lower cost, or, what is the usual case, for the same cost a much greater amount of illumination is obtained. Furthermore, there have been developed illuminants of such intense brightness as to make them unsuitable for general interior illumination, except for large areas, such as stores, public halls, workshops, railway stations, etc. To secure the best results for each particular location and problem is the province of the illuminating engineer.

For the comparison of various illuminants, the standard of reference is the standard candle (see PHOTOMETRY), while the degree of illumination on a surface distant 1 foot from a standard candle is called a "foot candle." To express luminous flux, there is used a unit called the "lumen," equal to the flux emitted in a unit solid angle by a point source of one candle power. For the C G S unit of illumination, one lumen per square centimeter, the name "phot" has been proposed, this being equal to 929 lumens per square foot. To put this ratio in another way, one foot candle is one lumen per square foot and is equal to 1.0764 milliphot. The unit of illumination commonly employed is the lux, which is equal to 0.0929 lumen per square foot, or 0.0929 foot candle.

In providing illumination a surface of reference, called the "plane of illumination," perpendicular to the rays of light, is chosen, which is that on which the effective degree of brightness for the special purpose is desired. In offices, schools, libraries, or stores, this reference plane is commonly taken at a height of from $2\frac{1}{2}$ to 3 feet from the floor, approximately that of a desk or table, and in certain locations, such as the book stacks of a library, the reference plane is chosen somewhat higher than this, say 5 to 6 feet. A picture gallery requires a vertical reference plane, the surface extending usually from 5 to 10 feet from the floor. Special problems in vertical lighting are often solved by an arrangement of lamps in vertical or horizontal rows, shielded by columns or coves, for bringing out the details of a chancel of a church, or a recess in an art gallery, as well as to display goods in show windows, where it is essential that the articles displayed may be adequately illuminated, while not disclosing the direct sources of light. Obviously there must be considerable calculation, involving not only the nature and dimensions of the area to be lighted, but also the intensity and distribution of the illuminants so that illuminating engineering involves no small amount of theoretical consideration as well as practical application.

Investigation shows a wide variance in the intensity of illumination required for different purposes. For ordinary reading as well as for drafting rooms and work of a similar character, an illumination of from 2.5 to 4 foot candles is usually satisfactory, while for the examination of or work on certain textiles, and in operations where the goods worked upon are dark in color or black, a higher degree of illumination is necessary, sometimes being carried to as much as 8 foot candles for satisfactory results. Proper illumination, however, requires not only sufficient light, but also the distribution of radiation in such manner that there are no deep shadows or points where sharp contrasts of light and shade are noticeable. Uniformity of illumination is one of the causes of the pleasing effect of the great area of the Grand Central Terminal concourse in New York City, with its adequate

and even illumination, both by daylight and by artificial light.

Illuminating engineers have made an extended study of the bad effects of glare, which is the regular or specular reflection of light from surfaces of paper, furniture, etc. At a certain angle the incident light is reflected directly from the page of a book, or the polished top of a piece of furniture, or even from the walls of a room, into the eye of the observer, making it less sensitive to detail and causing a strain and consequent fatigue that will lead to injurious results. Glare may be avoided by using more lamps of diminished brightness or by changing the position of the lamps, so that their radiations shall reach the desk or printed page at an angle that will cause diffuse reflection. For the general reduction of glare, however, the surfaces of walls and furnishings of a room must be of such nature and color as to diffuse the incident light from every possible angle. For interior illumination all lights should be shielded by globes or shades to prevent the radiations coming with undiminished intensity to the eye, as this causes excessive eye strain and its injurious consequences.

In order to avoid the many unsatisfactory effects of what is called "direct lighting," and also for the purpose of producing a more uniform illumination in the interior of buildings, the "indirect" system and the "semi-indirect" are both largely in use. The indirect system commonly employs an opaque bowl, suspended from the ceiling of the apartment to be lighted. Lamps are placed inside the bowl, from which the direct radiations are first received on the ceiling and upper portion of the walls of the apartment, resulting in a wide diffusion and satisfactory illumination without glare. In this system, however, some of the bowls used cause shadows on floor and furniture, so that the semi-indirect method is frequently preferred by architects and illuminating engineers, as in this latter system the lamps are placed in bowls made of translucent material, such as opalescent or white glass, alabaster, etc., with the result that a portion of the radiation from the lamps is received on the ceiling and walls and diffused by them, while another portion passing through the bowl is received directly on the floor and the furniture, but of so softened, diffused, and uniform a quality as to render the effect restful to the eye, yet providing sufficient illumination according to circumstances to render it easy to read or do any other kind of work in any part of the apartment lighted.

In school buildings much attention is being paid to the principles of correct illumination, as a large proportion of the increasing amount of eye trouble among school children doubtless is caused by bad lighting conditions in the class rooms, not omitting those that are usually worse at home. Children are frequently allowed to study with an unshaded light facing them at the desk. Likewise, in stores, factories, and workshops, faulty arrangements for lighting are also common. In machine shops an unshaded electric lamp is often hung in front of or directly over a lathe or milling machine, which, though throwing a bright light on the work, puts a blinding glare in the eyes of the workman the moment he looks up from the work, and making deep shadows around the base of the machines near the floor, where a man is likely to trip and fall, with resulting injury.

The color of the illuminant also is a matter of great importance in many illumination problems. Naturally, for the examination of textiles, the illumination of art galleries or public rooms, the nearest approach to daylight, at present realized in artificial illuminants in the tungsten lamp, must be secured. In many workshops this consideration can be neglected, and one of the most efficient illuminants in use, the mercury vapor lamp, with a pronounced green hue, is highly favored for a great variety of manufacturing plants, but is unsuitable for public places, owing to the ghastly appearance produced on the human countenance by the absence of red radiations from the lamp.

For street or outside illumination, lamps must be placed at such a height that the radiation will not strike directly in the eyes of pedestrians and drivers. They must be so spaced that there will be no areas in deep shadow, and at the same time must be located with regard to one another, to secure the maximum amount of radiation from each unit, without the waste which would accrue from too close spacing. According to economic and civic conditions in cities and villages, there are many systems of street lighting in use, ranging from incandescent lamps 300 feet apart, an arrangement suitable for small villages, to the most powerful flaming arc lights in pairs, providing a uniform illumination of sidewalks, roadway, and buildings with a brightness sufficient to enable one to read newspaper print.

It is estimated that at least \$200,000,000 a year are spent in the United States for lighting by oil, gas, and electricity, and that 20 per cent of this sum is wasted by faulty design and arrangement of the details of illumination. The work of the illuminating engineer is therefore of benefit to the community in many ways, as his advice in the installation and arrangement of lighting systems results in the social, eco-

nomic, and physiological benefit of the community as well as in the saving of large amounts of money.

The importance of the artistic, physiological, and industrial effects of proper lighting has attracted the attention of electrical engineers and architects and resulted in the formation of a society for the discussion and investigation of problems concerning this subject. The Illuminating Engineering Society in the United States was organized in 1906 and in 1915 had a membership of about 1500, comprising electrical engineers, architects, and decorators, as well as designers and manufacturers of fixtures. The society aims to bring together the interests enumerated herewith and to publish results of their investigations in both public and private lighting work. Its object is the advancement of the theory and practice of illumination, and the dissemination of knowledge relating thereto. Frequent meetings are held, as well as an annual convention, where papers are read and discussed concerning the latest practice and art of both public and private illumination. In London a society of the same name and with the same objects in view was founded in 1909, and there is a similar organization in Paris.

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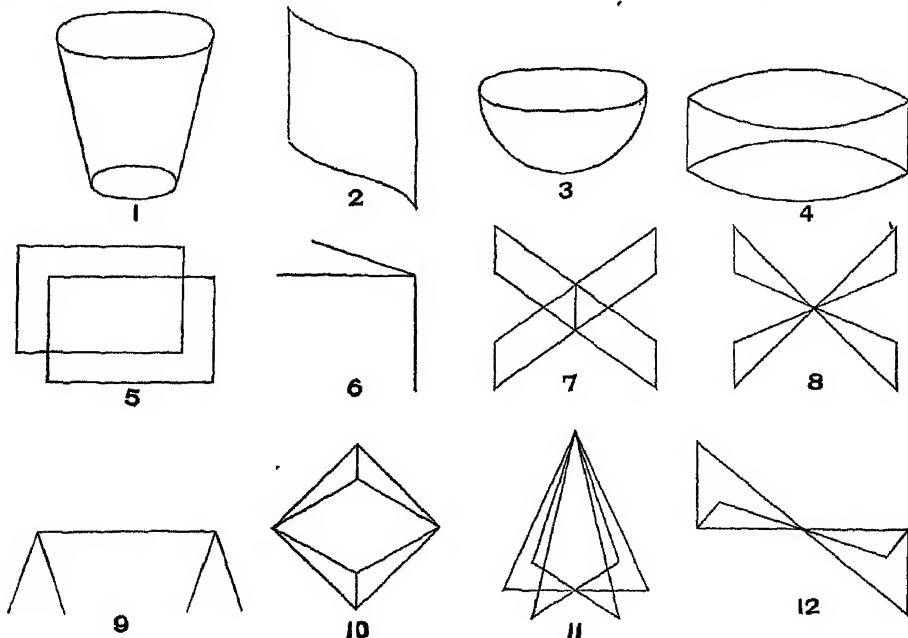


FIG. 1. ILLUSIONS OF REVERSIBLE PERSPECTIVE (From Titchener, *Experimental Psychology*)

Notice that while you look at the figures, without changing the position of the book, certain lines or planes appear now farther from and now nearer to the eyes. To show the influence of fixation and eye-movement, the figures must be drawn on a large scale, and preferably in white lines on a black ground.

1907-); *Transactions of the Illuminating Engineering Society* (ib., 1911-); H. Pender (ed.), *American Electrical Handbook* (ib., 1914). For the architect and engineer as well as the general reader: Cravath and Lansing, *Practical Illumination* (ib., 1907); W. S. Franklin, *Electric Lighting* (ib., 1912); Louis Bell, *Art of Illumination* (ib., 1912); C. E. Clewell, *Factory Lighting* (ib., 1913).

ILLUPI, il'ū-pī (East Indian name), **ILLUPIE**, **ELLOOPA** (*Bassia longifolia*). An East Indian evergreen tree of many local uses. The bark is prescribed in cases of itch; the gummy juice is employed as a remedy for rheumatism; the leaves and the milky juice of the immature fruit are also used in medicine; the flowers, roasted or boiled, furnish an article of food, and the seeds yield a greenish fixed oil, known as illupi oil.

ILLU'SION (from Lat. *illusio*, mockery, from *illudere*, to mock, from *in*, in + *ludere*, to play).

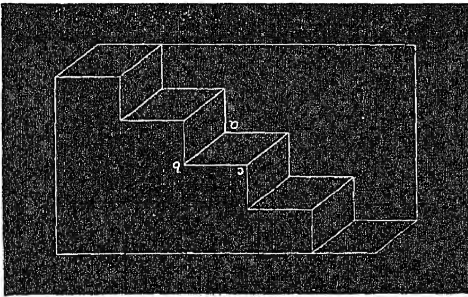


FIG. 2. MÜLLER-LYER'S REVERSIBLE STAIR FIGURE.

The figure fluctuates as you observe it. If at first you seem to be looking at a flight of steps, the appearance soon changes, so that you seem to see a piece of overhanging masonry. To show the influence of fixation and eye movement, the figure must be drawn on a large scale.

In general, a distorted or abnormal perception (q.v.). The word is used in English psychology in two principal senses: 1. As the counterpart of hallucination (q.v.), "an assimilation of an hallucinatory character" (Wundt), a distortion

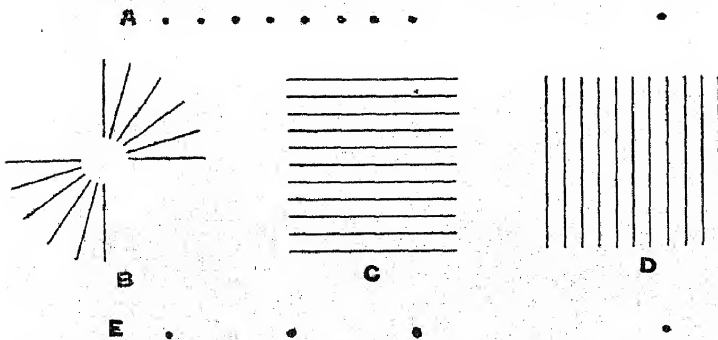


FIG. 3. VARIABLE ILLUSIONS OF EXTENT. (From Sanford, *Course in Experimental Psychology*.)

In *A* the space covered by the 8 dots at the left seems greater than that between the 8th and that at the extreme right. In *B* the quadrants with inscribed radii appear greater than those that are empty. The figures *C* and *D* (Helmholtz Squares) appear respectively higher and broader than they should by objective measurement. Figure *E* is a variant of *A*, the illusion being the reverse of that in *A*; here the eye tends to fixate the middle point of the left-hand distance and thus to apprehend that distance without traversing its length.

or misinterpretation of the contents of perception, due to an abnormal irritability of the sensory centres of the brain cortex. The distortion

may take the form of subjective enhancement of the intensity of stimulus, as when a gentle

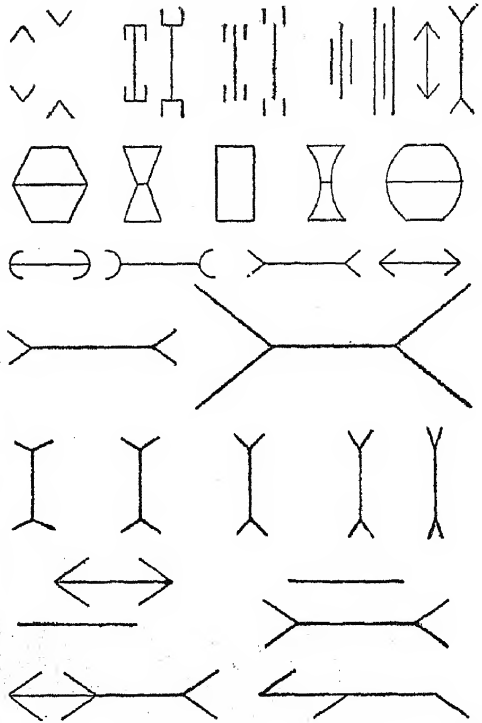


FIG. 4. THE ARROWHEAD AND FEATHER ILLUSION. (From Sanford, *Course in Experimental Psychology*.)

In the first row the distances between the points of the angles are equal, and the vertical lines subject to illusion are all equal to these distances and to one another. In the second row of figures the top and bottom lines are all equal; in the third and fourth rows the horizontal, in the fifth row the vertical, and in the sixth row the horizontal lines are all equal in length. In the lowest row the parts of the horizontal lines marked off by the points of the angles are all equal.

knocking at the door is taken for the growl of thunder; it may involve a qualitative alteration of the stimulus, as when the monotonous sighing of the wind is heard as angelic music; or it may consist in a fantastic modeling and grouping of the forms of perceived objects, as when a dimly seen stone or tree stump is regarded as a ghost. Sane persons of imaginative disposition are liable to illusion, more especially at times of mental stress or overwork; and, indeed, the readiness with which we can find faces in the fire and monsters in the clouds shows how short is the path from normal to abnormal assimilation. We reach the stage of unquestioned abnormality with patients who interpret the half-heard conversation of passers-by as threats directed against their life and see on the face of every stranger an expression of disgust or contempt or menace.

2. In its second meaning illusion is a perversion of the contents of perception due to structural or functional peculiarities of the perceptual apparatus (sense organs and cortex). So far from being abnormal, this form of illusion is both natural and necessary. We speak

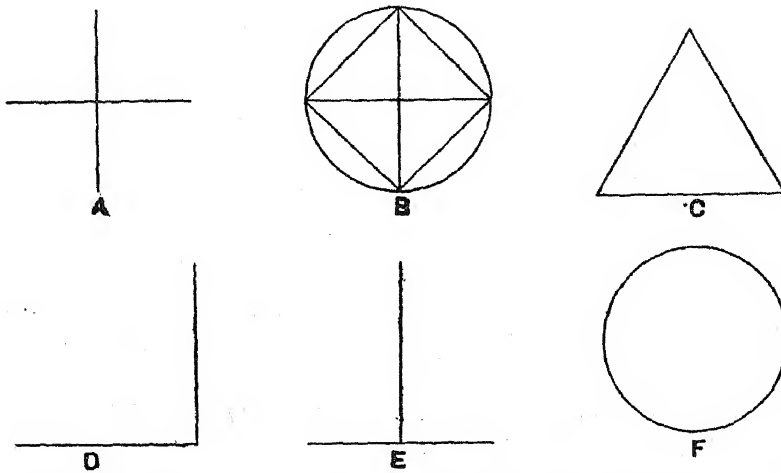


FIG. 5. CONSTANT ILLUSIONS OF EXTENT. (From Titchener, *Experimental Psychology*.)

In A-E, the vertical appear to be greater than the horizontal dimensions. A and B show further peculiarities, mentioned in the text. F gives rise to no illusion; it is inserted for comparison with B.

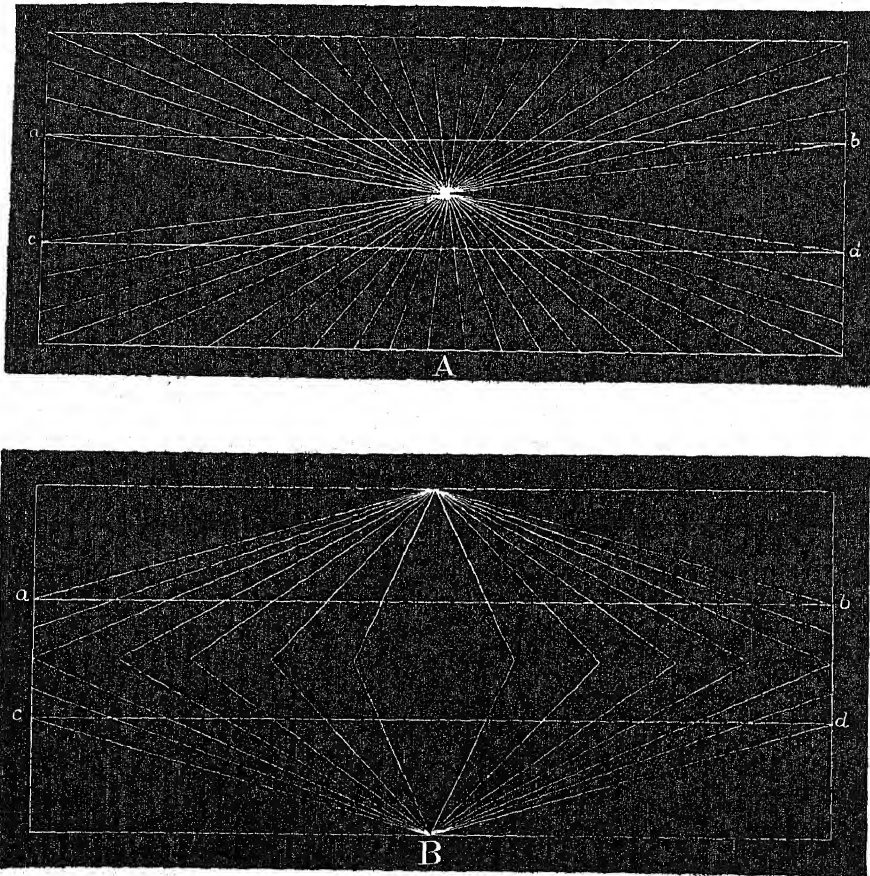
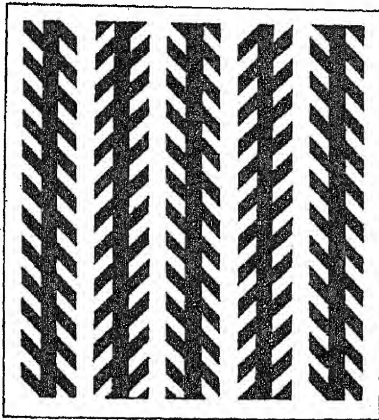


FIG. 6. VARIABLE ILLUSIONS OF DIRECTION. (A the Hering figure, B Wundt's figure.)

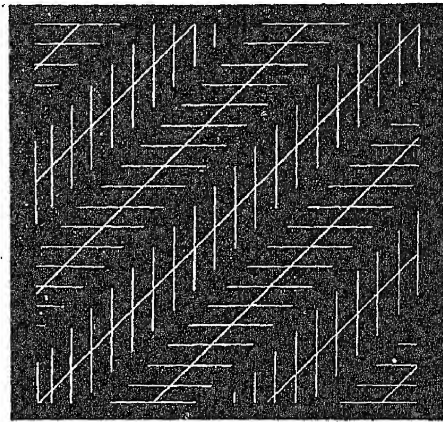
The objectively parallel lines *ab* and *cd* in A seem to be nearer together at the ends than in the middle. In B the opposite is the case.

of the perceptions as "illusory" simply because they are of a character different from that which our previous knowledge of the stimuli,

Wundt (q.v.), who seeks, so far as possible, to account for the illusions in physiological terms (fixation and eye movement); the second by



A



B

FIG. 7. VARIABLE ILLUSIONS OF DIRECTION. (Zöllner's figures.)

In A the vertical lines and in B the diagonal lines in the square appear to converge and diverge, though objectively they are parallel.

or our experience under other conditions, would lead us to expect. For instance, we know that all four sides of a square are equal. We expect therefore that a square will look as high as it is broad. As a matter of fact, the perfect square always looks like a rectangle whose vertical dimension is somewhat greater than the horizontal. Again, we are extremely familiar with the appearance of the circle, which we have seen in all sorts of figures and under the most varied conditions. When, then, we inscribe a square in a given circle, we do not expect that the appearance of circularity will be affected. In actual fact, the circle seems to be pinched in at the points where its circumference is touched by the angles of the square, so that we perceive not a circle at all, but four arcs apparently belonging to circles of less radius than the circle which should include the square. No one whose vision is normal can escape these illusions; their occurrence is, as we shall see, intrinsic to the perceiving eye in its function as a "space organ"; the perceptions are illusory only in the sense that they conflict with our other knowledge, i.e., with the verdict of the "mathematical" or "measuring" eye.

The most important of these "normal" illusions are the spatial illusions of touch and sight. The latter, which were first demonstrated by J. Oppel (1815-94) in certain simple geometrical figures, have been termed collectively the *geometrical optical illusions*. They are exceedingly numerous, and explanations have been almost as plentiful as illusions. Three attempts at systematic treatment have, however, been made by later investigators; the one by

Lipps (q.v.), who offers a "mechanical æsthetic" principle of explanation. Lipps's theory is, in brief, that we read into the lines and figures in question forces and counterforces, strivings and resistances, akin to those which we experience in ourselves; so that the column "seeks" or "strives"

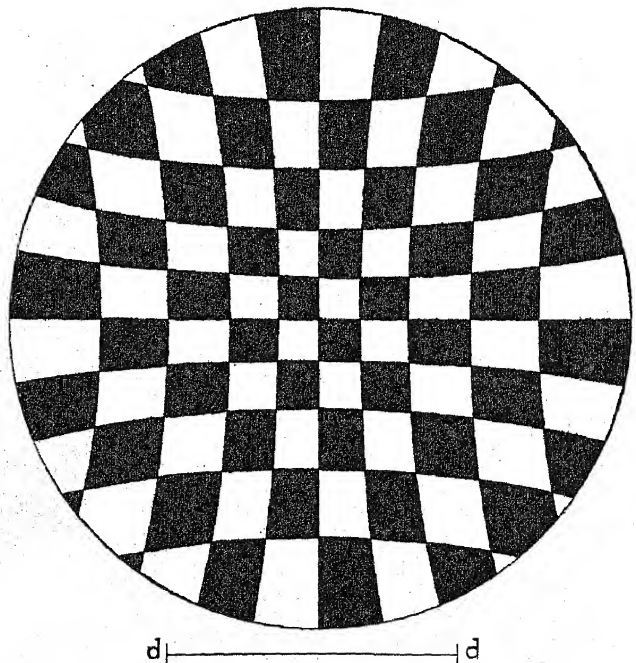


FIG. 8. CONSTANT ILLUSION OF DIRECTION. (Von Recklinghausen.)

Look at the centre of the figure with one eye, from the distance dd , and the whole appears as a field of squares.

to rise, the horizontal line to stretch itself, the circle to "hold itself together," etc. The third theory emphasizes our own general attitude to the object of perception. Just as we constantly

misread the headlines of the newspapers because we are prepared or predisposed for news of a certain sort, so do we perceive a geometrical figure in one way if we take it as a total impression, in another way if we take it critically, analytically, limiting our attention to certain lines and disregarding others, etc. We shall here give Wundt's classification and explanation, partly because they are the most complete, and partly because, in matters of perception, physiological conditions must take priority over psychological.

The first group of geometrical optical illusions contains (a) the illusions of reversible perspective. It is a familiar fact that many outline figures—a bowl, an open book, a cube, a stairway—will "turn inside out" in the most perplexing

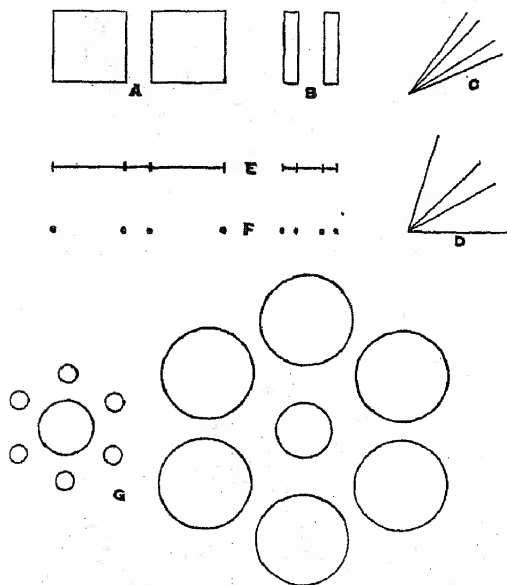


FIG. 9. ASSOCIATIVE ILLUSIONS. (From Sanford, *Course in Experimental Psychology*.)

In A and B the breadth of the included spaces, and in C and D the included angles, are objectively equal. In E and F the small central lines and spaces are equal. In G the circle surrounded by small circles is the same in size as that surrounded by large circles, though it appears larger.

way as one looks at them. Even two crossed lines, drawn X-wise upon a sheet of paper, may be made to take on the appearance of a right-angled cross, seen in perspective, with either the lower or the higher point of the line which forms the horizontal arms nearer to the observer. Very little practice suffices to show that the direction of perspective depends here upon the point fixated and the course along which the eye moves; the point of fixation is the point nearer the observer, and movement of the eye towards a given point brings that, in its turn, to the front of the figure. (b) Next follow the illusions of extent, variable and constant. A dotted line looks longer than a drawn line of equal objective length, for the reason that it offers more halting places as the eye moves along it. Draw an outline square; then a group of horizontal lines filling the same area as the square; and then a similar group of vertical lines. The horizontal group looks higher, the vertical group broader, than the objectively equal square, for the reason, again, that the

grouped lines offer more obstacles to the passage of the eye over the area of the figure. One of the most disputed figures of this class is the illusion of Müller-Lyer, or the arrowhead and feather illusion. Draw two vertical or horizontal lines of equal length. Tip the two ends

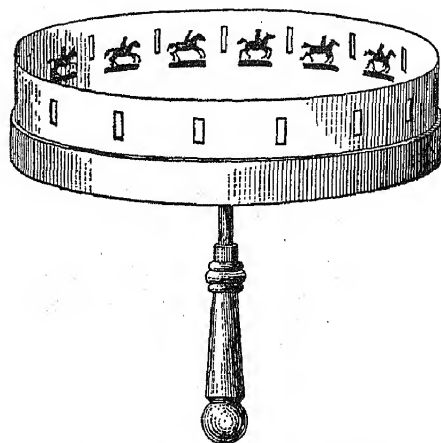


FIG. 10. THE STROBOSCOPE OR ZOETROPE.

Looking at the figures through the slits in the rim, you get, when the instrument is rotated, an effect of continuous movement, similar to that of the kinetoscope, and depending on the same conditions.

of the one with oblique lines directed inward (arrowheads), and the two ends of the other with oblique lines of the same length directed outward (arrow feathers); the latter appears considerably the longer of the two. Wundt's explanation is that the inward-going obliques offer a check to the passage of the eye along the principal line, while the outward-going obliques

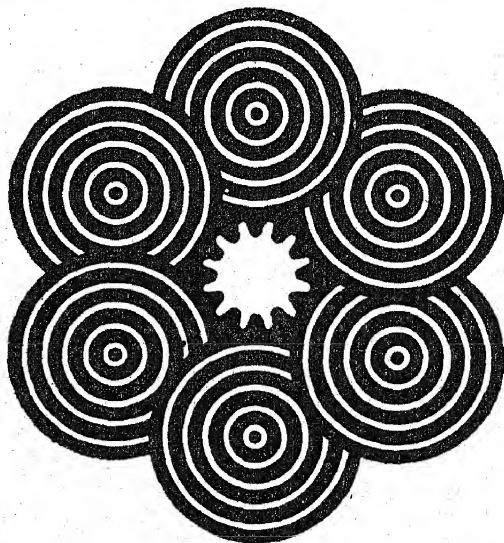


FIG. 11. AN ILLUSION OF MOVEMENT. (From Sanford, *Course in Experimental Psychology*.)

Move the figure around in a circle in its own plane, and observe the apparent motion of the six outer disks and the reverse movement of the central cogwheel.

favor a continuance of eye movement. The constant illusions of extent (due to asymmetries of muscular action about the eyeball) are summed

up in a right-angled and equal-armed cross. The vertical line in this figure seems to be longer than the horizontal, the upper vertical arm longer than the lower, and, in monocular vision, the outer horizontal arm looks longer than the inner. (c) Thirdly, we have variable and constant illusions of direction. Draw a large outline square, marking in one of the diagonals, and three or four lines parallel to the diagonal, at equal distances on either side of it. Now proceed to crosshatch the oblique lines, cutting the diagonal with short vertical

straight lines, owing to the concavity of the retina. (d) There remains a group of illusions which Wundt classes as "associative," i.e., as psychological, not physiological, in origin. If equal short horizontal lines are drawn, some grouped closely together and some widely spaced, the latter appear longer than the former, the length of the line is "assimilated" to the size of the interspaces. In the same way, if two broad and two narrow rectangles are drawn, of equal height and separated by equal spaces, the space between the larger rectangles will look

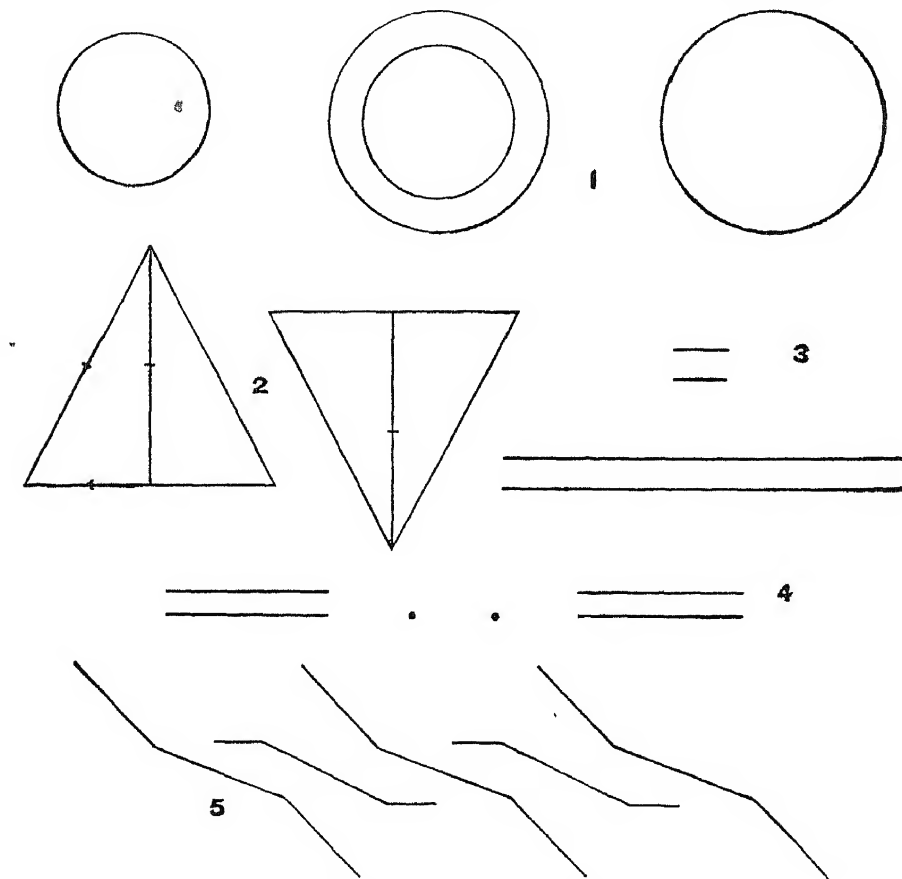


FIG. 12. MIXED ILLUSIONS (From Titchener, *Experimental Psychology*)

In 1 compare the size of the left-hand circle with the inner circle in the middle figure, also the outer circle of the middle figure with the right-hand circle. In 2 note the apparent lengths of the halves of the various bisected lines. In 3 the shorter parallel lines seem farther apart than the longer parallels (Wundt). In 4 "the dots are really at the level of the lower line, but seem a little too high, especially when the figure is held so as to make the lines oblique" (Sanford). In 5 the middle sections of the five broken lines are all equal and parallel, though they appear to be otherwise (Lippis).

pieces, the two adjoining obliques with short horizontal pieces, the two oblique lines next beyond these with verticals again, the two next with horizontals, and so forth. Notice that the parallel obliques no longer look parallel, but appear to converge and diverge alternately. The explanation of this and similar illusions is that small angles are overestimated, and large angles relatively underestimated, and the reason for such overestimation, again, is that it takes more muscular effort and energy to start a movement of the eye than it does to continue a movement already begun. The constant illusion of direction is that, under certain conditions of fixation, hyperbolas are perceived as

smaller than the space between the narrower, the interspaces are differently estimated by "contrast" with the adjacent figures. (See CONTRAST.) (e) Finally, we may, of course, have figures in which several of the above-mentioned motives, physiological and psychological, cooperate to produce the illusion.

It is significant that, with the associative illusions, Wundt is forced to leave the periphery for the centre, the sense organ for the cortex, physiology for psychology, since, if central or psychical factors are of influence in one sort of illusory perception, there seems to be no a priori reason why they should not be effective in others. Recent investigations show, in fact, a distinct

tendency to give the central organ a far larger share in the determination of perception than is allowed it in Wundt's *Physiological Psychology*, concepts like predisposition, attitude, set, tendency, have been introduced and are freely used, and experiments have been made in which variation is not confined to the figures studied, but extends as well to instructions for observing, direction of attention, etc. We may perhaps believe that a satisfactory theory of illusory perception will combine the first and the third of the theories mentioned above, Lipps's view, at least in any general form, must probably be given up.

We may further include under the general heading of optical illusions (1) the physical illusions produced by mirrors, lenses, prisms, etc. (see MIRAGE, REFLECTION, REFRACTION), (2) the physiological illusions of color (see AFTER-IMAGES, CONTRAST), (3) illusions of movement, such as, e.g., the apparent movement of the moon when viewed through drifting clouds, and (4) illusions of distance. Under the latter category falls the apparent enlargement of sun and moon when seen near the horizon. The distance between the observing eye and the horizon seems to be longer (owing to the haziness of the air, the number of intervening objects, etc.) than the distance between the eye and the zenith. But if two objects subtend the same visual angle (give the same retinal image) at different distances, the one which is farther off must be larger than the other.

Touch, no less than sight, is subject to spatial illusion. (a) If two compass points are set down upon the skin, first on an area of greater and then on an area of less sensitivity, the distance between them will seem to be greater in the former case than in the latter. Give the points, e.g., a separation that enables them to be clearly perceived as distinct impressions when they are set crosswise upon the skin of the upper arm. Now draw the compasses down the inner surface of the arm to forearm, wrist, and finger tips. The two parallel lines which they describe will appear to converge and diverge upon the regions of less and greater sensitivity. Or set the points down, vertically, upon the upper and lower lips, and draw the compasses outward, towards the ear. The points seem to converge as they travel over the skin. (b) Cross the tip of the second over that of the third finger and place a marble or other small object between the crossed tips. Since the two surfaces now stimulated are never affected, in ordinary life, by one and the same object, but only by two different objects, the single marble is "felt" as two. This illusion of localization is described by Aristotle, in his tract *On Dreams*. (c) Draw a given length of coarse thread between the finger and thumb, at first slowly and then more quickly. The thread appears to be much longer in the former case, the separate pressure sensations have a longer time in which to run their course undisturbed by subsequent pressures, and fullness of sensation is interpreted as length of thread. (d) If a point be moved over the skin at a uniform rate, it will seem to travel more quickly as it crosses areas of greater sensitivity and to become slow again as it enters regions of less sensitivity. See also MOVEMENT, PERCEPTION OF.

A striking illusion of temperature is described by the English philosopher Locke (qv). Hold the one hand in a bowl of heated, the other in

a bowl of cold, water. After a short time plunge both hands into a bowl of lukewarm water. This will appear hot to the cooled, and cold to the heated, hand. The illusion is due to the preceding adaptation of the temperature organs of the skin. (See CUTANEOUS SENSATIONS.) An equally striking illusion in the sphere of kinæsthetic sensation is afforded by the fact that a small weight, when lifted, always appears heavier than a larger weight of the same objective heaviness. The smaller weight stimulates intensively a limited cutaneous area, with its underlying tissues, the larger weight stimulates lightly a large area of skin and leaves the underlying tissues practically unaffected. These instances, which could be multiplied almost indefinitely, show clearly that the term "illusion" implies nothing more than a discrepancy between perception and objective measurement.

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ILLUSION. See HINDUISM, MAYA.

ILLUSION COMIQUE, é'l'u'zyon' kô'mêk', L' (Fr, The Comic Illusion). A complicated and improbable play by Corneille (1636), embracing a comedy and a tragedy.

ILLUSIONS, OPTICAL. See ILLUSION.

ILLUSIONS PERDUES, é'l'u'zyon' par'du', LES (Fr, The Lost Illusions). A work in three parts by Balzac (1837-43).

ILLUSTRATED LONDON NEWS. The oldest illustrated weekly, founded in 1842 by Herbert Ingram.

ILLUSTRATION. A term generally used in reference to the pictorial decoration and illustration of books. In the more usual sense book illustration is the addition to a book of pictures (and indirectly of maps and plans) which may aid in the right understanding of the text. This service they may render in a serious and practical way by giving views of buildings, accurate drawings or other reproductions of dress, portraits of individuals, copies of works of art named, and the like, these being things which are impossible adequately to describe in words, and of which a clear presentation to the reader is desired. On the other hand, the illustrations may also be merely extensions of the text, thus, when Cruikshank or Leech illustrates *Oliver Twist* or *Mr Jorrook's Hunt*, the description or narrative passage of the text is in a sense repeated by the artist—a part of the story is retold in line and light and shade.

A book consisting almost entirely of pictures, or having those for its principal subject, cannot be said to be an illustrated book. Thus, the volumes of the *Paris Salon*, with large photographs of the paintings and statuary of the year with a text which is rather perfunctory, or that little volume which made the delight of schoolboys 60 years ago, *Mr Jonathan Oldbuck*, or, in more recent times, the albums of Caran

D'Ache and Forain, or Howard Pyle's or T. S. Sullivan's "Tables," are of this class. In the one case the pictures are the book, and the text is not absolutely needed, in the other case the pictures and the brief legends or the rewritten Æsop Fable 100 words long, form together a humorous study of which the picture is much the more important part. This is hardly illustration. And in like manner, when the pictures drawn for a book are large, and few in number, and are printed on separate plates and bound in, they have less the air of illustration, and indeed serve less well their purpose as illustration, than those which, being smaller, are inserted in the text. The very admirable pictures by Albert Lynch given with the quarto edition of Maupassant's *Pierre et Jean*, although spoken of with great respect by excellent judges and although admirable compositions, are yet less effective as illustrations than the less pretentious and really less able drawings by Myrbach, and others which are scattered through the duodecimo volumes of Daudet's *L'Immortel* or Bourget's *Mensonges*, and immeasurably inferior to the roughly cut headpieces by Meissonier in *Les contes rémois*. From this point of view the famous "vignettes" of the eighteenth-century illustrated books are the least satisfactory of illustrations. They render, indeed, a single scene or incident of the story, but they are wholly unrealistic in character, the figures ordinarily being posed without general truth of attitude or truth of gesture, and while they are attractive and instructive as works of the draftsman and of the engraver's art, they are also models of all that is to be avoided in book illustration.

History The history of illustration is hard to treat as a continuous narrative. The Egyptian manuscript *Books of the Dead* contain numbers of delicate and very ornamental paintings, usually of small size and combined with the text in an admirable way, and the paintings in the Ani Papyrus in the British Museum, and a few other recently discovered manuscripts, have larger drawings. On the other hand, we are without any knowledge of Greek manuscripts of an early date with drawings accompanying them. Of Roman Imperial manuscripts with illustrations there is nothing known prior to the Christian epoch, but the paintings which accompany the famous *Genesis* of the Vienna Museum, certain manuscripts of plays of Terence, and a very few other contemporary books remain to us. It is the opinion of excellent critics that these monuments of a decadent epoch will mislead us if we try to judge from them the character of work of the earlier and better times, but those who urge this may forget that one art continues to flourish while others lapse. Moreover, the antique look and something of the pagan spirit are still to be found in the Christian illustrations of the fourth and fifth centuries, whereas the Church has had its own way with the mediæval manuscripts of the eleventh and twelfth centuries, those of much earlier date, like the Irish and the Anglo-Saxon, are too barbaric and too purely ornamental to be considered as actual illustrations, despite the decorative effectiveness of the illuminated page.

The mediæval manuscripts combine illustration by means of miniatures with the decoration of the page in a very wonderful way. (See ILLUMINATED MANUSCRIPTS.) With the re-

vival of learning in Italy the painting of miniatures became an elaborate art, and some of these miniatures of early time are finished pictures with background, distance, and everything that a modern landscape or genre picture has, except cast shadows. Even the shadows appear towards the close of the fifteenth century, and with the shadows comes the end of illumination considered as a separate art. The famous *Breviarium Grimalii* is, however, without shadows and yet is dated at the very close of the fifteenth century, and the borders which Albert Dürer drew for the margins of the printed book called *Mammilian's Prayer Book*, and which were executed in 1515, have their elaborate groups of busy little figures drawn without traceable or outlined shadows, although the figures themselves may be partly relieved on a dark shading.

With the earliest printed books come the earliest wood engravings which are of exclusively artistic character. The *Hypnerotomachia* of the so-called Poliphilo (Francisco Colonna), printed by Aldus at Venice in 1499, has large and very open drawings, sometimes filling nearly the whole of a small folio page. The *Epistles of Saint Jerome*, of 1497, has a great number of small illustrations, not larger than a lady's visiting card, but full of character and containing sometimes a dozen figures boldly drawn and skillfully grouped. The several illustrated editions of the *Divine Comedy* of Dante, of which perhaps the earliest is of 1497, have woodcuts and illustrations also in outline. During the next century this same tendency to simple and rather formal illustration, in outline except for some arbitrary shading, continues, and it is not to be doubted that the expectation was that hand coloring would be called in to complete these designs. In fact, many books, with their pictures elaborately colored by hand, remain to us from this epoch. The constant reprinting of the early books tended to preserve the abstract and simple character of illustration, and it is not until the middle of the sixteenth century, with the copper engraved plates illustrating the different manuals of swordplay, and the delicate little woodcuts illustrating the Old Testament, and the "Dance of Death" ascribed to Holbein, that a freer style is introduced. Entire freedom in drawing for wood engraving came slowly, even Albert Dürer's work is largely confined to outline, and single plates of the "Apocalypse" and the "Life of Mary" are found elaborately painted in water color and touched with gold. But with the last quarter of the sixteenth century complete light and shade is sought for, as in the woodcuts ascribed to Jost Amman, published by Feyerabend of Frankfort, and those of Vecellio, dated 1590. In the seventeenth century were published quaint books of history and topography, sometimes adorned with crowded battle pieces, or, like the curious history of the wars between England, France, and the United Provinces, with views of sea fights, minutely engraved on copper and effective enough in a black and crowded way. One of these pictures shows the great fire of London in 1666, the book being printed two years later. The books published by Matthæus Merian of Frankfort with the admirable views of German cities are of this time and Wenceslaus Hollar began his wonderful career of simple and perfect work as an engraver in Merian's employ. Book illustration was, however, feeble during the hundred years

from 1650 to 1750, although the fashion of providing elaborate frontispieces and title-pages engraved on copper produced some very admirable samples of the engraver's art. The French *Livres à Vignette* mentioned above are noteworthy, in spite of their inadequacy, as helping to restore the art. (Consult De Goncourt, *Les vignettistes*, Paris, 1868.) Wood engraving was revived in the course of the eighteenth century, and as early as 1775 Thomas Bewick produced his illustrations of Æsop's *Fables* and his natural-history books, the *Quadrupeds* and the *Birds*, the little narrative drawings serving as tailpieces to the chapters of the quadrupeds forming the most important step in book illustration which had been made for a century.

The great modern movement in book illustration begins about 1830 with the woodcuts made for French classics, such as Molière and Bernardin de Saint-Pierre, and in England with the earliest books illustrated by Cruikshank. The work of Rowlandson, ending as Cruikshank began, must have influenced him greatly at first. But Cruikshank soon worked out of the exaggerated and purely farcical manner which the earlier artist retained to his death, and achieved distinction primarily as an illustrator of books, keeping up his full power until an advanced age. His work exists in great abundance in woodcut and also in a simple kind of etching, in which last process he was followed and surpassed as to technical excellence by John Leech.

For the important influence of the humorous journals, see CARICATURE. The foundation of *Punch* led to the creation of a whole school of illustrators, and Leech, as a draftsman for wood engraving, was the chief of Englishmen of his time, keeping up his power till his death, in 1864. Richard Doyle and Hablot K. Browne were his contemporaries, Du Maurier and Charles Keene, the latter one of the greatest artists in black and white, were his successors. All these men did much work in illustrating separate books. The Frenchmen Jean François Gigoux, Tony Johannot, Sulpice Chevallier (Gavarni), were their contemporaries in the French world of books.

The book illustrations of the years since 1870 are remarkable for the introduction of photographic process prints (see PHOTO-ENGRAVING), but there has been also, particularly in the United States, a notable rise and decline of wood engraving (q.v.). Colored illustrations can be produced now at reasonable cost, and some of them are of great beauty. (See THREE-COLOR PROCESS, LITHOGRAPHY.) Of decisive influence upon the development of illustration of the present day are the numerous illustrated magazines and newspapers in America and Europe. See PERIODICAL, NEWSPAPER.

That form of illustration which is sometimes called Extra Illustration, or Grangerism (from James Granger, died 1776, a celebrated print collector), is the insertion into a book, by way of illustration, of pictures which did not originally belong to it. Thus, a history or an historical novel may be illustrated by collecting portraits of men famous at the time dealt with in the book, and scenes of historical interest previously drawn and engraved, and these prints may be bound into the book or simply laid between its leaves. In this way a book of one volume may be extended to a dozen, and as some of the plates will be large, the smaller ones are occasionally "inlaid," i.e., their edges

are fitted into a hole cut in a larger sheet of paper, while the printed leaves are treated in the same way, so that all the leaves of the enlarged book may be of the same size. This proceeding has been the cause of the destruction of many valuable books, for a whole volume will be sacrificed for the sake of its frontispiece or its illustrated title-page, or marred by the extraction from it of one or two portraits. Consult Bouchot, *The Book*, translated by Bigmore, edited by Grevel (London, 1890); Joseph Pennell, *Modern Illustration* (ib., 1895); id., *Illustration of Books* (ib., 1896); White, *English Illustration*, "the Sixties" (ib., 1897); Blackburn, *Art of Illustration* (Edinburgh, 1901); Crane, *Decorative Illustration of Books* (London, 1901); Kirkbride, *Engraving for Illustration, Historical and Practical Notes* (New York, 1903); Sketchley, *English Book-Illustration of Today* (London, 1903); Hardie, *English Coloured Books* (ib., 1906).

ILLUSTRATION, L', lē'us-trā'syōn'. An illustrated Paris weekly, founded in 1843, modeled on the *Illustrated London News*.

ILLUSTRIERTE ZEITUNG, il'us-trēr'te tsā'tung (Ger., illustrated news). The oldest German illustrated weekly, founded in Leipzig by J. J. Weber in 1843.

ILLYRIA, i-lī'rī-a. See ILLYRIANS; ILLYRICUM.

ILLYRIAN PROVINCES. See ILLYRICUM.

ILLYRIANS (Lat. *Illyria*, from Gk. Ἰλλυριοί, *Illyrioi*, from Ἰλλυρίς, *Illyris*, Ἰλλυρία, *Illyria*, Illyria). A people of doubtful ethnic kinship, who at the dawn of history inhabited the northern and eastern shores of the Adriatic and the northwestern part of modern Greece. From this latter region a migration took place at a very early period across the Ionian Sea to the southeastern corner of Italy. It seems, on the whole, plausible to regard the modern Albanians as the representatives of the Illyrians, both in ethnology and in language. See ALBANIA, ALBANIAN LANGUAGE.

ILLYRICUM (Lat., from Gk. Ἰλλυρικόν, *Illyrikon*, from Ἰλλυρίς, *Illyris*, Ἰλλυρία, *Illyria*, Illyria). The Roman name of a Roman administrative district, whose limits in ancient times varied very considerably (Illyria was the name of the territory occupied by the Illyrians, Illyricum often included much more than that territory). In the fourth century B.C. the Illyrians inhabited the eastern coast of the Adriatic Sea and the adjacent islands, with the western parts of Macedonia as far south as Epirus. Philip of Macedon conquered the country as far as the river Drilon (modern Drino), and thence arose the division into *Illyris Græca* and *Illyris Barbara*, afterward *Illyris Romana*. The former, now Albania (q.v.), was incorporated with Macedonia. *Illyris Barbara* or *Romana* was divided into Iapydia, Liburnia, and Dalmatia. There were Greek settlements on the coasts of Illyria as early as the sixth century B.C. The kings of Macedonia long fought with the Illyrians, Philip, father of Alexander the Great, finally subdued them and annexed part of their country. After this time the Illyrians were much addicted to piracy, which soon brought them into collision with the Romans, who waged a successful war against the Illyrian Queen, Teuta, in 229 B.C. About 168 B.C. the southern Illyrians became subject to Rome, but the subjugation of the northern Illyrians was not effected until the time of Augustus (33 B.C.).

Under the Roman Empire the country of the Illyrians, under the name of Dalmatia (in the wider sense), formed the southern part of the diocese of Illyricum, which extended as far north as the Danube. It is represented in modern times by part of Croatia, nearly all of Bosnia, Dalmatia, Herzegovina, Montenegro, and the northern part of Albania. Under Constantine the prefecture of Illyricum embraced a great part of the Roman dominions in Europe east of the Adriatic. A decree of Napoleon, Oct. 14, 1809, organized the dominion known as the Illyrian Provinces, erected out of territories taken from Austria. It comprised Carniola, part of Carinthia, most of Croatia, Dalmatia, Istria, Fiume, etc. At his fall these provinces were united as a kingdom to the Austrian Empire, and some alterations were made in its boundaries. The kingdom was divided into the two governments of Laibach and Trieste, Laibach being the capital, which arrangement continued till 1849, when the kingdom was subdivided, for administrative purposes, into the duchies of Carinthia and Carniola, and the coast district, containing Gorz and Gradisca, Istria and Trieste. Consult *Bahn, Die Ursprung der römischen Provinz Illyrien* (Grimma, 1876), Zippel, *Die römische Herrschaft in Illyrien bis auf Augustus* (Leipzig, 1877), Eduard Meyer, *Geschichte des Altertums*, vol. 1 (2d ed., Stuttgart, 1907), Schutt, *Untersuchungen Zur Geschichte der alten Illyrien* (Bieslau, 1910).

ILMEN, il'mën, *Russ pron* ēly'-mä-ny'. A lake in the Russian Government of Novgorod, situated about 60 feet above the level of the Gulf of Finland (Map Russia, D 3). Area, over 350 square miles. The banks are mostly low and in some parts marshy. Ilmen receives many streams, and its waters, which discharge into Lake Ladoga through the Volkhov, are almost always muddy. The fisheries of the lake are extensive and exploited largely by artels (see **ARTEL**). There is steam navigation during the summer between Novgorod and Staraia Russia.

IL'MENITE (so called from the *Ilmen* mountains in the southern Urals), or **MENACONITE**. A mineral with the composition $(\text{FeTi})_2\text{O}_4$, crystallizing in the hexagonal system, possessing a semimetallic lustre and a color ranging from brown to iron black. It occurs in scattered grains and crystals as an abundant constituent of certain igneous rocks, including basalt, diabase, and gabbro, and of magnetic iron ore. The proportion of titanium, which varies within wide limits, gives rise to a number of varieties of ilmenite, such as *kibdelophane*, *crochtonite*, *hystatite*, *mohsinite*, etc. When mixed with magnetite (titaniferous iron ore) in any considerable amount, it has been considered detrimental to the latter for smelting purposes. Ilmenite is found at various localities in Russia, Norway, France, in the Adirondacks of New York, in Connecticut, Massachusetts, and in Canada.

ILME'NIUM (Neo-Lat., from the *Ilmen* mountains in the southern Urals). A name given to a mixture of columbium and tantalum, which was at one time mistaken for an element.

IL NOTAJÓ DA LENTINO. See **LENTINO**, JACOPO DA.

IL OBEID. See **EL OBEID**.

ILOCANO, il-ò-ka'nò. The people known as Ilocano make up one of the most important of the civilized tribes of the Philippines. They form practically all the Christianized popula-

tion of Ilocos Norte, Ilocos Sur, and Union provinces, and have migrated in large numbers to other parts of Luzon. They seem to be of the same stock as the pagan tribe known as Tinguan, whom they resemble in personal appearance and language. After the arrival of the Spaniards the Ilocano were converted to Christianity and soon adopted many of the customs and utensils of the newcomers, but they still retain many traces of the old culture. The census of 1903 puts the total number at 803,942. See **PHILIPPINE ISLANDS**.

ILOCOS NORTE, è-lò'kòs nòr'tà. A Philippine province occupying the northwest corner of the island of Luzon (Map Philippine Islands, C 1). It is bounded on the west and north by the China Sea, on the east by the provinces of Cagayan and Abra, and on the south by the latter and Ilocos Sur. Area, 1265 square miles. It is traversed from north to south by a chain of mountains rising to a height of 4828 feet and covered with forests of pine and hardwoods. As the province is exposed in winter to the north winds, its climate is more tempered and more agreeable to foreigners than that of other parts of the island. The province is well watered, the principal river being the Laoag, and the valleys are very fertile, producing, besides the grains and fruits of the temperate zone, a fine quality of rice, good cotton and tobacco, chocolate, and sugar. Fruits include the pineapple, orange, and lemon. Iron ore is abundant. Cattle and horses are a great source of wealth, and the *carabao*, a species of ox or buffalo peculiar to the Philippines, is very numerous. The fisheries on the coast are also lucrative, a textile known as "blankets of Ilocos" is produced, and, on the whole, the province is one of the best developed on the island. A highroad leads through the province from Manila, and a railroad is projected from that city to Laoag (qv). Ilocos Norte was united with Ilocos Sur previous to 1818, when they were separated on account of their growing importance and population. Capital, Laoag. Pop., 1903, 178,995, chiefly Ilocano and Igorot. The census of 1903 classifies this total as 176,785 civilized and 2210 "wild."

ILOCOS SUR, sòor. A Philippine province, situated in the northwestern part of the island of Luzon (Map Philippine Islands, C 2). It is bounded on the north by Ilocos Norte, on the east by Abra and Lepanto, on the south by La Unión, and on the west by the China Sea. It is a narrow strip of rather low and flat coast land, with an area of 491 square miles. It is partly bounded by the river Amburayan and crossed by the Agra and a number of smaller streams, in the east are the mountains, culminating in Nagupu (4154 feet), the soil is very fertile, producing corn, peanuts, chocolate, indigo, sugar, and coconuts, all of which are exported. In the mountains are copper and timber, while there are also manufactures of furniture and carriages, baskets and hats, and the weaving of cotton textiles by the women in their homes is practiced all over the province. The towns are connected by good roads, though most of the rivers have to be forded, as there are few bridges. The highroad and projected railroad from Manila to Laoag passes through the province. Pop., 1903, 187,411, of which 173,800 are classed as civilized and 13,611 as "wild." Capital, Vigan (qv). See **ILOCOS NORTE**.

ILOILO, è'lò-è'lo. A province comprising the

southern half of the island of Panay in the Philippines and 56 outlying islands, one of which, Guimaras, has an area of 228 square miles and a population (1903) of 21,306 (Map Philippine Islands, D 5) The area of the province is 1776 square miles Pop, 1903, 410,315, of which 6383 are classed as "wild." The Panay part of the province has a coast line of 140 miles, with numerous safe harbors and anchoring grounds, among which those of Iloilo and Concepción are the best The province is separated from those of Capiz and Antique on the north by a chain of rugged mountains It is covered with forests of pine and dyewood, from which numerous rivers and torrents flow to the sea, often bringing destructive floods The climate, tempered by the constant monsoons, is much more moderate and far more healthful than that of Manila The level lands, which constitute the greater part of the area of the province, produce sugar, tobacco, corn, rice, coffee, cotton, and hemp The chief manufacturing industry is that of textiles, such as homespun fabrics of sinamay, piña, jusi, also the refining of sugar Commercial communication between the cities is easy and regular, the roads being generally in good condition The inhabitants consist almost entirely of Visayas, with some European and Chinese *Mestizos*, or half breeds, in the cities, and a few Negritos in the mountains The Visayas were first converted to Christianity by the Augustine fathers in the middle of the sixteenth century The province suffered for a long time from the piratical Moros, and forts were built here by the Spaniards as early as 1581 In 1616 an unsuccessful attempt was made by the Dutch to capture Panay At the end of the Spanish-American War in 1898 the natives were in complete possession of the island and showed determined resistance to American authority The capital, Iloilo (qv), is the second port of the Philippines

ILOILO The capital of the Province of Iloilo (qv), situated on the low sandy shore of the southeastern side of the island of Panay, on a strait separating Guimaras Island from the mainland (Map Philippine Islands, D 5) It has a seminary, a good government house, a church, an excellent harbor, is fortified and, next to Manila, is the chief commercial centre of the Philippines It makes jusi, lime, vinegar, piña, machinery, hats, and vehicles Its chief exports are sugar, tobacco, rice, coffee, and dyewoods, and it supports several industrial establishments, among which are a machine shop and a foundry Pop, 1903, 19,054 In February, 1899, it was partly burned by the Filipinos when bombarded by United States troops

ILONGOS, è-lôn'gôs A town of the Philippine Islands See HILONGOS

ILONGOT, è-lôn'gôt, or IBALAO, è'bá-lou'. The Ilongot live on the headwaters of the Cagayan River in northern Luzon They are primitive Malays, yet many of the tribe show a deep strain of Negrito blood Their costume is simple and much abbreviated The dress of the man consists of a bark clout and a girdle, while that of the woman is a short, one-piece bark skirt Society is on a very simple plane When a good hunter is mated to an industrious wife there is a commodious dwelling and an ample supply of food A man who has taken many heads or who is reputed to possess magical power may be held in high esteem Even in these instances a man is not lifted above his fellows in

daily life or in matters of government Government is, in fact, according to custom True village life is wholly absent, the dwellings being scattered along the mountain sides close to the clearings, in which the people raise rice, corn, millet, and sweet potatoes To these products are added the game and fish which they are able to procure with their primitive traps and weapons The tribe is to-day the wildest and least known in northern Luzon The census of 1903 puts the total number of persons in the tribe at 3016 See PHILIPPINE ISLANDS

ILOPANGO, è'lô-pan'gô A lake in the Central American Republic of Salvador, situated in a fertile and beautiful plain surrounded by high hills, a short distance east of the capital (Map Central America, C 4) Its water is saline and sulphurous and unfit to drink, though it abounds in fish It is 10 miles long by 6 broad and contains a number of islets, of which one was raised to about 400 feet by an eruption in 1879-80 and remains in the form of a volcanic cone

ILORIN, è-lô'ren, or **ALORI**, è-lô're The capital of a British province of northern Nigeria, West Africa, on the Asa, a tributary of the Niger, 170 miles northeast of Lagos (Map Africa, E 4) Like Abeokuta (qv), it was a municipal confederation of the Kingdom of Yoruba, established for mutual protection The town is surrounded by a mud wall, 12 miles in circumference, and has several mosques, Mohammedans predominating among the heterogeneous population of natives It has an extensive caravan trade with Central Africa and numerous local industries, including woven fabrics, arms, wood carving, pottery, and leather Pop (est), 1911, 60,000 to 80,000.

ILOW, è'lô, CHRISTIAN, BARON (c 1585-1634). An Imperial general in the Thirty Years' War, born at Neumark He entered the ranks at the beginning of the war and rapidly rose to the command of a regiment After fighting bravely under Tilly at Stadtlohn (1623), he was transferred to Wallenstein's army He easily won the confidence of his general and took part in the intrigues which resulted in the break between Wallenstein and the Emperor He was assassinated at the banquet of Eger

ILSE, è'lze, PRINCESS In German legend, the daughter of the giant of the Ilsenstein, who threw herself into the flood when parted from her lover and was changed into a water spirit

ILUS (Lat, from Gk 'Ilos) In Greek mythology, the reputed founder of Troy He was born in Dardania on Mount Ida and was the son of Tros, great-grandson of Dardanus, and father of Laomedon In an athletic contest in Phrygia he received, as the prize of victory, 50 youths and 50 maidens In addition, at the command of the oracle, a spotted cow was given to him, and he was directed to follow her until she should lie down and on that spot to establish a city This spot was the hill of the Phrygian Ate, where he founded the town which from his name was called Ilios, or Ilion, and from the name of his father, Troy The Palladium (qv) came to him there as a sign from Zeus

IL'VA See ELBA

ILYA MUROMETS, è-lyà' mûrô-mëts (Russ, Eljah of Murom) The favorite hero of the Russian *bylina* (qv), a representative of the peasant class The strongest of the "younger paladins," he spent his life in guarding his country against her enemies and in protecting wid-

ows and orphans. In extreme cases only did he shed blood. Usually the foe was frightened away by the exhibition of Ilya's strength in turning some mighty oak into splinters or some similar display of prowess. Consult Isabel Hapgood, *Epic Songs of Russia* (New York, 1885).

IMAGE. A term used in psychology, (1) for an elementary mental process having the same general attributes as sensation, and (2) for a primary complex of such imaginal processes. In the former sense images are the characteristic elements of ideas, as sensations are the characteristic elements of perception.

It is a moot question whether the elementary image is psychologically distinguishable from sensation, and even whether, as centrally initiated, it is psychophysically distinguishable from sensation as peripherally initiated, for peripheral stimulation seems to play a part in the arousal of many processes that are commonly termed images. Starting out from sensation, e.g., we have first the afterimage (See AFTER-IMAGES). Next comes the memory-afterimage, a sort of instantaneous photograph of the original sensation, resembling the positive afterimage in quality, but differing from it in dependence upon intention, brief stimulation, and precedent clearness of sensation. Then follow the images of synesthesia (q.v.) and of hallucination (q.v.), both of them definitely sensory in character. Certain visually minded persons have, further, "mental images" of such substantial nature that they can excite afterimages, thus, an imagined blue may be followed by an afterimage of yellow. In minds of this constitution, again, habitual memories are likely to be carried by stable and vivid images of a "typical" or "generic" sort. So far there is no observable difference between image and sensation. We are on more doubtful ground when we pass to the "faded" images by which, e.g., we fill out the missing lines in a drawing, or interpret a few blotches of color as a human figure in a certain position, and when we come to the memory-image proper. It is often said that the quality of the memory-image is relatively pale, misty, washed out, and that its duration and intensity are less than those of the corresponding sensation. But these are differences only of degree, sensations themselves may be pale, weak, and short-lived. There may perhaps be a textural difference between the memory-image proper and the sensation, but this question, as was said above, is still unsettled.

If we consider as images those processes of a sensory kind which appear without any obvious intervention of an external stimulus, we may say that visual and auditory images are common. Taste and smell images, though of undoubted occurrence, play but a small part in human consciousness. Kinesthetic images are difficult to discriminate from weak kinesthetic sensations due to actual movement or muscular contraction. Other organic images are rare.

Consult: Galton, *Inquiries into Human Faculty* (London, 1883), Kuelpe, *Outlines of Psychology* (New York, 1901), *Philosophische Studien*, xix (Leipzig, 1902), Ebbinghaus, *Grundzüge der Psychologie* (ib., 1905), Wundt, *Physiologische Psychologie* (ib., 1908-11), Peillaube, *Les images* (Paris, 1910), Titchener, *Text-Book of Psychology* (New York, 1910).

IMAGE WORSHIP. The use, in public or private religious services, of graven or painted representations of sacred persons or things, and

especially the exhibition of honor, reverence, or worship to such representations. The most primitive religions needed no images, for the gods were the visible heavenly bodies or objects of nature. When the gods became more abstract, the sense of their reality was helped by the formation of images (See IDOL). The early Hebrews used images. David kept teraphim in his house, and the two shrines at Bethel and Dan had images of Jehovah in the form of a bull (1 Kings xii 26 ff.). The work of the prophets resulted in severe condemnation and, in the exile and later, in sarcasm and scorn of image worship (Isa. xl 10-17, Bel and the Dragon). Before the beginning of the Christian era image worship had completely disappeared from Hebrew usage. In Christianity images, not for worship but as aids to devotion, came into use before 200 A.D. Tertullian at the beginning of the third century mentions the image of the Good Shepherd as engraved upon chalices quite as if this were and had been for a long time a common practice. Crucifixes seem to have been introduced very early, this is proved by a graffito, often supposed to be a pagan caricature of Christianity, probably of the end of the second century, scratched upon the wall of a room in the palace of the Caesars (See GRAFFITO). It is a rude representation of a man standing in the attitude of prayer, with outstretched hands, before a grotesque caricature of the crucifixion, bearing the legend "Alexamenus worships God." The tombs of the Christians in the Roman catacombs, many of which are of a date anterior to Constantine, frequently have graven representations of the dove, of the cross, of the symbolical fish, of the ship, of Adam and Eve, of Moses striking the rock, of Jonah, of Daniel in the lions' den, of the Apostles Peter and Paul, and, above all, of the Good Shepherd. The chapels of the catacombs are profusely decorated with sacred representations, the age of which it is not easy to determine with accuracy, though some of them seem to come at least from the second century. After the condemnation of the Nestorian heresy in 430, statues and pictures of Christ, of the Virgin Mary, and the saints were very commonly used in public and private religious services and in churches and religious edifices. As the mass of the people became more ignorant in the sixth and seventh centuries, certain abuses with regard to the veneration of images in religious worship crept in. These led to a reaction against image worship in the East, which culminated in the movement known as iconoclasm (q.v.), because it commanded the breaking of images. The formal beginning of iconoclasm was an edict by the Emperor Leo III (717-741), known in history as the Isaurian. The exact terms, as well as the exact date, of the edict are unknown, though Hefele places it in 726. It commanded the destruction of all pious images in public places. The removal of a famous image of Christ over the palace door caused a popular uprising in Constantinople. In Greece and Lower Italy the opposition to the edict was pronounced. The Patriarch of Constantinople refused to allow it to be put into force, and Pope Gregory II (715-731) condemned it. Leo persisted, however, apparently influenced by the Caliph Yazid II, who set the example of destroying images in accordance with the Mohammedan religion. St. John of Damascus (died about 760), who lived under the Caliph, wrote three discourses

in defense of the use of images for religious purposes Under Leo's successor, Constantine Copronymus, a council confirmed the Imperial edict Leo IV also upheld iconoclasm Under his widow, Irene, however, the second Council of Nicaea (787) reaffirmed the orthodox views as to image worship, but succeeding emperors, except Michael the Stammerer (820-829), who tried to effect a compromise, were iconoclasts On Feb 19, 842, Theodora, widow of Theophilus (829-842), brought back the images in triumph to the cathedral of Constantinople This date is kept as the feast of orthodoxy By an error the acts of the Nicene Council were sent in a garbled translation to Charlemagne He objected to their publication in his realm in the *Libri Carolini*, now generally considered authentic, sent to Pope Hadrian I (772-795) about 793 The Nicene Council solemnly declared that the worship to be paid to images is not true adoration, *latreia*, which is to be given to God alone, but *douleia*, or veneration While the Greek verb προσκυνεῖν, 'to worship,' is used, it is explained that it is only in the sense of honoring because they represent God or His saints, and because the honor which is given to images is referred to their prototypes When the error of translation was explained, the misunderstanding ceased to exist The Council of Trent reaffirmed the declarations and distinctions of the second Nicene Council as to image worship, adding that there is "no virtue in images themselves on account of which they are to be worshiped, that no petition can be addressed to them, and that no trust is to be placed in them" The council advocates the true use of images, however, contending that they are of great advantage especially for the rude and unlearned, for whom they serve as memorials of the sufferings and of the mercy of Christ, as instructive records of the virtues of the saints and exhortations to the imitation of their example, and as incentives to the love of God and to the practice of piety In

certain parts of the world there are in Roman Catholic churches images for which there is a special veneration Sometimes the traditions, if not the images, can be traced back to pagan times The belief of the common people in such an image is the foundation of Selma Lagerlof's story, *The Antichrist*, but the Church has never officially taught that such images have power in themselves In the Eastern churches, especially the Russian, great reverence is paid to printed pictures of the saints, or representations in relief, called icons Every house has one or more, and in the churches the iconostasis, or screen which separates the sanctuary from the body of the church, is covered with them Statues, except of the angels, are not used

The Reformers rejected the use of images as an unscriptural novelty and stigmatized the Catholic practice as superstitious or even idolatrous The Zwinglian and subsequently the Calvinistic churches absolutely and entirely repudiated all use of images for the purpose of worship Luther, on the contrary, while he condemned the Roman worship of images, regarded the simple use of them, even in the church for the purpose of instruction and as incentive to faith and devotion, as one of those indifferent things which may be permitted, although not of necessary institution In the Lutheran churches of Germany and the northern kingdoms, pictures, crucifixes, and religious emblems are still freely retained In all wholly Protestant communions images are entirely unknown, although their use has been revived in the High Church portion of the Anglican communion of late years Consult Hefele, *Conciliengeschichte* (7 vols, Freiburg, 1854-71), Ludtke, *Die Bilderverehrung und bildlichen Darstellungen in den ersten christlichen Jahrhunderten* (ib, 1874), Kraus, *Roma sotterranea* (ib, 1879), E B Tylor, *Primitive Culture* (4th ed, 2 vols, London, 1903), L R Farnell, *Evolution of Religion* (ib, 1905).

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